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APPENDIX

Robust Summaries for Substances in the HPV Test Plan for the Diesters Category of the Aliphatic Esters Chemicals

Part I. HPV Substances in the Diesters Category
Part II. Surrogate Diesters

November 14, 2003

Appendix -Robust Summaries for Aliphatic Esters - Diesters HPV Test Plan

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Part I - Robust Summaries for HPV Substances in the Diesters Category of Test Plan

HPV Diesters Substances identified by CAS Numbers and organized according to parent diacid diesters: (see Table 2 and 3 in the HPV Test Plan)

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Part II - Robust Summary/ SIDS Toxicity Summary for Surrogate Diesters

Four Surrogate Diesters Substances: (identified by CAS Numbers below)

- Maleic acid, dibutyl ester (CAS No. 105-76-0)
- Adipic acid, dibutyl ester (CAS No. 105-99-7)
- Adipic acid, di-C7-9 branched and linear alkyl ester (CAS No. 68515-75-3)
- Adipic acid, bis(2-ethylhexyl) ester (CAS No. 103-23-1).

PART I. HPV Substances in the Diesters Category

Acute Oral Toxicity (CAS No. 105-52-2)

Test substance	Maleic acid, bis(1,3-dimethylbutyl) ester
CAS Number	105-52-2
Remarks	Purity was not provided
Method/guideline	Other
Test type	Acute oral toxicity
GLP	No
Year	1954
Test system	Species (Strain): Rat (Carworth-Wistar), Sex: Males, weight 90-120 g, age not given. No. of animals: 5/treatment. Dosage: Single oral administration (gavage) Dose levels not given: dose volume between 1 and 10 mL Vehicle not specified: water, corn oil of Tergitol. Use of control group not given, animals were non-fasted. Observations: Mortality during 14 days Statist. Method: Thompson, Weil
Results	Oral LD_{50} : 7.46 g/kg
Remarks	No measurements for clinical signs, body weights, food consumption and necropsy were performed during the study. No results of the mortalities were given. Information about several aspects of studies was incomplete or absent.
Conclusions	The acute oral LD_{50} for this test substance was 7.46 g/kg.
Data Quality	Not assignable (Klimisch reliability 4) Secondary literature. Range-finding study; limited number of animals.
References	H. Smyth, C. Carpenter, Range-finding toxicity data: List V. Arch. Ind. Hyg. Occup. Med. **10:** 310-318 (1954).
Other	Date last updated October 3, 2003

Melting Point, Boiling Point (CAS No. 142-16-5)

Test Substance	Maleic acid, bis(2-ethylhexyl) ester
CAS Number	142-16-5
Remarks	Purity not specified
Method/guideline	Other, not specified. Data obtained from secondary literature.
Test type	Melting point and boiling point
GLP	Not specified
Year	Not specified
Remarks	Method of melting point and boiling point determination was not given. Physical chemical properties were summarized for various maleic acid diester derivatives in Patty's Toxicology reference book (David et al. 2001).

Conclusions	Melting Point - 60 °C Boiling Point 164 °C (10 mm Hg)
Data Quality	Not assignable [Klimisch reliability 4]. Secondary literature.
References	David RM, et al. (2001). Esters of aromatic mono-, di-, and tricarboxylic acids, aromatic diacids and di-, tri-, or polyalcohols *in* Patty's Toxicology, 5th edition, Bingham E, et al. (eds.), Vol. 6, Chapter 80, pp. 635-932. J. Wiley, New York. Cited in Table 80.15 , pg. 791.
Other	Date last updated October 3, 2003.

Acute Oral Toxicity (CAS No. 142-16-5)

Test substance	Maleic acid, bis(2-ethylhexyl) ester
CAS Number	142-16-5
Remarks	Purity was 100%
Method/guideline	Other, not indicated
Test type	Acute oral toxicity
GLP	Not indicated
Year	1977
Test system	Species (Strain), Rat (Hilltop-Wistar), males Sex Mean weight 98-107 g No. of animals 13 males. Dosage Single oral administration of 10.0 ml/kg to 10 males and of 5.0 ml/kg to 3 males; no controls; feeding *ad libitum.* Observations Mortality/clinical signs twice on day 1, daily from day 2 to 8, and on day 14. Body weights on day 1 and 14. Necropsy on day 14. Statist. Method Not specified

Results

Effect/observation	Day	Dose Group (5 ml/kg)	Dose Group (10 ml/kg)
Mortality	1-14	None	None
Clinical Signs	1-14	None	Findings consisted of wet fur
Body Weight Gain	1-14	No treatment-related effects	No treatment-related effects
Necropsy	14	No treatment-related effects	No treatment-related effects

Remarks	This study was range-finding toxicity test. No measurements for body weight on day 7 were performed. The animals were not fasted before treatment. Thirteen (13) males were used instead of 5/sex/dose group Dose level (g/kg) could not be calculated, since density was not indicated. Hence, LD_{50} value was expressed in ml/kg.
Conclusions	Oral LD_{50} > 10 ml/kg
Data Quality	Reliable with restrictions {Klimisch reliability 2] Restrictions due to limitations mentioned; study was non-GLP
References	Unpublished confidential business information
Other	Last updated October 3, 2003

Melting Point and Boiling Point (CAS No. 6938-94-9)

Test Substance **CAS Number** **Remarks**	Adipic acid, diisopropyl ester 6938-94-9 Purity not specified
Method/guideline	Not specified.
Test type **GLP** **Year**	Melting point and boiling point Not specified Not specified
Remarks	Method of melting point and boiling point determination was not given. Physical chemical properties were cited in Handbook of Chemistry and Physics
Conclusions	Melting Point -1 °C Boiling Point 120 °C (6.5 mm Hg)
Data Quality	Not assignable [Klimisch reliability 4]. Secondary literature.
References	Handbook of Chemistry and Physics. R.C. Weast (ed.). 53 rd Ed., CRC, Cleveland OH, pg. C-265.
Other	Date last updated October 10, 2003.

Acute Oral Toxicity (CAS No. 6938-94-9)

Test Substance **CAS Number** **Remarks**	Adipic acid, diisopropyl ester 6938-94-9 Purity not specified
Method/guideline	Other, not specified
Test type **GLP** **Year**	Acute oral Not specified 1984
Test system	Species: Rats (albino) Sex: Female No. of animals: 5/treatment Dosage: 15 g/kg of formulation containing 20.75% diisopropyl adipate. No information given on vehicle or other components of formulation.
Test Conditions	Information not available.
Results	LD_{50} > 15 g/kg for formulation. Estimated LD_{50} > 3.11 g/kg for diisopropyl adipate based on its percentage (20.75%) in formulation.
Remarks	There were reported no mortality or abnormal responses or adverse effects after 7 days of observations.
Conclusions	The acute oral LD_{50} of diisopropyl adipate was estimated to be greater than 3.11 g/kg based on the reported LD_{50} > 15 g/kg for formulation which contained 20.75% of the test substance.

Data Quality	Not assignable [Klimisch reliability 4]. Secondary literature.
References	R.L. Elder (1984). J Am Coll. Toxicol., **3** (3): 101-130 (1984). Final report on the safety assessment of dioctyl adipate and diisopropyl adipate.
Other	Date last updated October 3, 2003.

Melting Point, Boiling Point, Vapor Pressure (CAS No. 1330-86-5)

Test Substance **CAS Number** **Remarks**	Adipic acid, diisooctyl ester 1330-86-5 Purity was not indicated
Method/guideline	Other, not specified. Data from secondary literature.
Test type **GLP** **Year**	Melting point, boiling point and vapor pressure Not specified Not specified
Remarks	Methods of determination were not given. Physical chemical properties were summarized for various adipate (i.e., adipic acid diester) ester derivatives in Patty's Toxicology reference book (David et al. 2001).
Conclusions	Melting Point - 70 °C Boiling Point 205-220 °C (4 mm Hg) Vapor Pressure <0.12 mm Hg (150 °C)
Data Quality	Not assignable [Klimisch reliability 4]. Secondary literature.
References	David RM, et al. (2001). Esters of aromatic mono-, di-, and tricarboxylic acids, aromatic diacids and di-, tri-, or polyalcohols *in* Patty's Toxicology, 5th edition, Bingham E, et al. (eds.), Vol. 6, Chapter 80, pp. 635-932. J. Wiley, New York. Cited in Table 80.13 , pg. 740.
Other	Date last updated October 17, 2003.

Acute Oral Toxicity (CAS 1330-86-5)

Test Substance **CAS Number** **Remarks**	Adipic acid, diisooctyl ester 1330-86-5 Purity was not indicated
Method/guideline	Other, not specified. Data from Secondary Literature.
Test type **GLP** **Year**	Acute oral Not specified 1968
Test system **Test Conditions**	Species: Guinea Pig Remarks: Information not available.
Results	LD_{50} > 5 ml/kg
Conclusions	The acute oral LD_{50} of diisooctyl adipate was reported to be similar to dioctyl adipate, which was estimated to be greater than 5 ml/kg in guinea pigs. At 5 ml/kg body weight, no mortality was observed.

Data Quality	Not assignable [Klimisch reliability 4]. Secondary literature.
References	R. Lefaux. Practical Toxicology of Plastics. CRC Press, Cleveland OH, pp. 359-360 (1968). Similarly cited in Hazardous Substances Data Bank (HSDB) for diisooctyl adipate, HSDB number 5813; last updated Feb. 14, 2003 at http://csi.micromedex.com/assm.asp/HS5813 (accessed July 24, 2003).
Other	Date last updated October 3, 2003.

Biodegradation (CAS 1330-86-5)

Test Substance **CAS Number** **Remarks**	Adipic acid, diisooctyl ester 1330-86-5 Purity was not indicated
Method/guideline	OECD Guideline 301B
Test type **GLP** **Year**	Aerobic Biodegradation No 1994
Test system	Exposure Period: 28 Days Inoculum: Activated Sludge, Domestic. Kinetics: Not Reported Biodegradation Products: Not Reported Analytical Monitoring: No
Test Conditions	Treatment replicates were prepared by combining glass-distilled water, a mineral substrate, pH buffer, activated sludge and the appropriate test substance. Three replicates of the test material and two replicates of positive control (aniline) were prepared and evaluated in 1 liter glass vessels. Carbon dioxide evolved from biodegradation was trapped in barium hydroxide solution and residual hydroxide titrated with standardized HCl solutions to determine the amount of CO_2. The amount of CO_2 was monitored at various time points over a period of 28 days. Test flasks were continuously stirred for 28 days. Temperature range and pH were not reported. Concentrations for Test Substance was 20 mg C /L for test substance. Concentration for aniline (positive control) was 20 mg C/L.
Results	Test substance biodegraded to the extent of 86.76% in 28 days. Test material met 10-day window criterion for readily biodegradability. Positive controls achieved 88.34% biodegradation in 28 days.
Conclusions	The substance was readily biodegradable.
Data Quality	Reliable with restrictions [Klimisch reliability 2]. Summary report only, incomplete data set.
References	Unpublished confidential business information
Other	Date last updated October 3, 2003

Boiling Point (CAS No. 108-63-4)

Test Substance	Adipic acid, bis(1-methylheptyl) ester
CAS Number	108-63-4
Remarks	Purity not specified
Method/guideline	Other, not specified
Test type	Boiling point
GLP	Not specified
Year	Not specified
Remarks	Method of determination was not given.
Conclusions	Boiling Point 175 °C (2 mm Hg)
Data Quality	Not assignable [Klimisch reliability 4]. Physical chemical property information supplied by member company to ACC Aliphatic Esters Panel.
References	Unpublished confidential business information
Other	Date last updated October 17, 2003.

Acute Oral Toxicity (CAS No. 108-63-4)

Test substance	Adipic acid, bis(1-methylheptyl) ester
CAS Number	108-63-4
Remarks	Purity not indicated
Method/guideline	Other, not indicated
Test type	Acute oral toxicity
GLP	No
Year	1972
Test system	Species: Rat, weight 200-300 g No. of animals: 5/treatment. Dosage: Single oral (gavage) administration of 2, 4, 8, 16, 32 or 64. g/kg; no controls; feeding *ad libitum* but food was withheld ~24 h prior to dosing. Observations: Mortality/clinical signs daily for 14 day Statist. Method: Not indicated.

Results

Dose (g/kg) body weight

Effect	**Day**	**2**	**4**	**8**	**16**	**32**	**64**	**DR** (B)
Mortality	1-14	0/5	0/5	0/5	0/5	0/5	2/5	x
Clinical signs (A)	1-14			+	+	+	+	x

(A) Sluggish locomotion, lethargy, ocular swelling and wet, scrufty, rough fur was noted. Survivors returned to normalcy within seven days. (B) DR = Dose related mortality and clinical signs

Remarks	Each dose level consisted of 5 animals. Males and females were indicated to be distributed equally, but no further information was provided. It is not clear whether the animals were group-caged by gender. The report was limited. No measurements of body weights or post-mortem investigation were reported.
Conclusions	Oral LD_{50} > 64 g/kg body weight

Data Quality	Reliable with restrictions [Klimisch reliability 2]. Limited report, non-GLP
References	Unpublished confidential business information
Other	Last updated October 3, 2003

Melting Point, Boiling Point, Vapor Pressure (CAS No. 33703-08-1)

Test Substance **CAS Number** **Remarks**	Adipic acid, diisononyl ester 33703-08-1 Purity was not indicated
Method/guideline	Other, not specified
Test type **GLP** **Year**	Melting point, boiling point and vapor pressure Not specified Not specified
Remarks	Methods of determination were not given. Physical chemical properties were summarized for various adipate (i.e., adipic acid diester) ester derivatives in Patty's Toxicology reference book (David et al. 2001).
Conclusions	Melting Point - 60 °C Boiling Point 233 °C (5 mm Hg) Vapor Pressure 0.9 mm Hg (200 °C)
Data Quality	Not assignable [Klimisch reliability 4]. Secondary literature.
References	David RM, et al. (2001). Esters of aromatic mono-, di-, and tricarboxylic acids, aromatic diacids and di-, tri-, or polyalcohols *in* Patty's Toxicology, 5th edition, Bingham E, et al. (eds.), Vol. 6, Chapter 80, pp. 635-932. J. Wiley, New York. Cited in Table 80.13 , pg. 740.
Other	Date last updated October 17, 2003.

Water solubility (CAS No. 33703-08-1)

Test Substance **CAS Number** **Remarks**	Adipic acid, diisononyl ester 33703-08-1 Purity was not indicated
Method/guideline **Test type** **GLP** **Year**	Other. Slow-stir method for water solubility determination (Letinski et al. 2002) Water solubility Not specified 2002
Test conditions	Slow-stir method of Letinski et al. (2002) was used to avoid problems of emulsion and phase separation that may occur with the flask method (OECD 105) for water immiscible low solubility liquids. Slow-stir water solubility vessels consisted of glass water aspirator bottles (4 to 12 L) fitted with spigots fitted with short-length Tefzel tubing and glass stopper. The vessels were filled with carbon-treated well water and poisoned with 50 mg/L $HgCl_2$. Test material was added to water at a loading rate of 1 mg/L using a microliter syringe and

	mixture stirred quiescently with little or no visible vortex using magnetic stirrer with Teflon stir bar. Performed at 20 C in temp controlled laboratory incubator or environ chamber. Equilibration time for slow stir was between 10-15 days. Quiescent mixing was stopped one hr prior to sampling. Aliquots of bottom water sample were removed from the spigot port. Test material in water sample was extracted on solid phase extraction (SPE) apparatus using ODS extraction disks. Ethyl acetate containing internal standard (o-terphenyl) was used a solvent to elute test material off the SPE. Collected extracts were reduced to 0.5 ml volume before the test material was quantitated by GC-FID.
Remarks	This recent slow-stir technique for measuring water solubility was shown to be suitable for water insoluble materials like the adipate diesters. The water solubility data reported for several diesters in this paper are in good agreement with previously published data for adipates and phthalates.
Conclusions	Water solubility for adipic acid, diisononyl ester was determined to be 0.00022 mg/L (n=3).
Data Quality	Reliable without restrictions [Klimisch reliability 1].
References	Letinski DJ et al. (2002) Slow-stir water solubility measurements of selected alcohols and diesters. Chemosphere, **48:** 257-265.
Other	Date last updated October 17, 2003.

Acute Oral Toxicity (CAS No. 33703-08-1)

Test Substance	Adipic acid, diisononyl ester
CAS Number	33703-08-1
Remarks	Purity not indicated
Method/guideline	Other
Test type	Acute oral
GLP	No
Year	1968
Test system	Species: Rats; Sex: Not specified. No. of animals: 5/dose level Dosage: Oral gavage, undiluted test substance administered.
Test Conditions	Remarks: Groups of five rats were dosed orally, by stomach tube, at levels of 0.0346, 0120, 0.417, 1.45, 5.0, and 10.0 g/kg of body weight. The animals were observed for a period of 14 days for mortality and signs of systemic toxicity. The animals were necropsied at the end of the observation period.
Results	LD_{50} was >10 g/kg
Remarks	No animals died at any of the doses tested. Signs of toxicity were observed at 1.45, 5.0, and 10.0 g/kg and included inactivity, labored breathing, and staining of the fur coat. The rats at the 5.0 and 10.0 level lost weight initially, however all rats recovered by the end of the observation period. There were no significant findings at necropsy.
Conclusions	The acute oral LD_{50} for the test substance was >10 g/kg.
Data Quality	Reliable with restrictions [Klimisch reliability 2] Screening study; limited number of animals.

References	Unpublished confidential business information.
Other	Date last updated October 3, 2003.

Acute Dermal Toxicity (CAS No. 33703-08-1)

Test Substance	Adipic acid, diisononyl ester
CAS Number	33703-08-1
Remarks	Purity not indicated
Method/guideline	Other
Test type	Acute dermal
GLP	No
Year	1968
Test system	Species: Rabbits Sex: Not specified. No. of animals: 4/dose level Dosage: Dermal administration, undiluted test substance administered.
Test Conditions	Single applications of the test substance were made to the clipped, abraded abdominal skin of rabbits at doses of 0.05, 0.20, 0.794, and 3.16 g/kg. Four rabbits were tested at each dose. After 24 hours, the skin was cleaned to remove residual test material. The animals were observed for a period of 14 days for mortality and signs of systemic toxicity, then necropsied at the end of the observation period.
Results	LD_{50} was >3.16 g/kg
Remarks	No animals died at any of the doses tested. There were no signs of toxicity throughout the observation period and no significant findings at necropsy. Slight irritation of the skin was observed during the first week after dosing which consisted of slight to moderate redness, slight swelling and transient slight swelling.
Conclusions	The acute dermal LD_{50} for the test substance was >3.16 g/kg.
Data Quality	Reliable with restrictions [Klimisch reliability 2] Screening study; limited number of animals.
References	Unpublished confidential business information.
Other	Date last updated October 3, 2003.

Repeated Dose Toxicity (CAS No. 33703-08-1)

Test Substance	Adipic acid, diisononyl ester
CAS Number	33703-08-1
Remarks	Purity not indicated
Method/guideline	Other
Test type	13-week subchronic dietary study
GLP	No

Year	1971
Species/strain	Rats/strain not specified
Route of Administ.	Dietary
Duration of test	13 weeks
No. of animals	10 /sex/dose
Dose/Conc. Levels	0, 50, 150, and 500 mg/kg/day
Sex	Males and females
Frequency of treatment	Daily for 13 weeks
Control Group	10/sex
Post-exposure observat.	None.
Statist. Methods	ANOVA; preliminary tests by methods of Bartlett, Scheffe, Rao, Sachs and Fischer-Behrens (modified t-test).
Remarks on Test Conditions	Male and female rats were fed the test substance daily for 13 weeks at dietary levels of 0, 50, 150, and 500 mg/kg/day. Clinical observations, body weights and food consumption were recorded weekly. Hematology, blood chemistry, and urinalysis were performed on 5 rats/sex/group at week 4 and 13. A complete necropsy was performed after 13 weeks and organ weights were recorded. Tissues were examined microscopically.
Results	The NOAEL was 500 mg/kg/day.
Remarks	At the high dose only, there was a statistically significant increase in the ratio of kidney weight to body weight for both sexes. However, the absolute kidney weights were not altered, and there were no significant histopathologic changes.
Conclusions	There were no significant findings in any of the dose levels tested.
Data Quality	Reliable without restrictions [Klimisch reliability 1] Comparable to a guideline study.
References	Unpublished confidential business information. Diisononyl Adipate: 90-Day Dietary Administration in Rats.
Other	Date last updated October 3, 2003.

Repeated Dose Toxicity (CAS No. 33703-08-1)

Test Substance	Adipic acid, diisononyl ester
CAS Number	33703-08-1
Remarks	Purity not indicated
Method/guideline	Other
Test type	13-week subchronic dietary study
GLP	No
Year	1971
Species/strain	Dogs/beagles
Route of Administ.	Dietary
Duration of test	13 weeks
No. of animals	4 /sex/dose
Dose/Conc. Levels	0, 0.3, 1.0 or 3.0% (high dose adjusted to 6.0% during weeks 9-13)
Sex	Males and females
Frequency of treatment	Daily for 13 weeks

Control Group	4/sex
Post-exposure observat.	None.
Statist. Methods	Not specified.
Remarks on Test Conditions	Male and female beagle dogs fed the test substance daily for 13 weeks at dietary levels of 0.3, 1.0, or 3.0% (3% was increased to 6% at week 9). The animals were observed daily; and body weights and food consumption were recorded weekly. Hematology, blood chemistry, and urinalysis were performed initially and at 4 and 13 weeks. A complete necropsy was performed after 13 weeks. Organ weights were recorded and tissues examined microscopically.
Results	The NOAEL was 1.0% (in diet) (approximately 274 mg/kg/day)
Remarks	There were no significant findings at 0.3 or 1.0% in the diet. Adverse effects were noted only at the high dose. These effects included decreased body weight and food consumption, increased liver weight, elevated enzyme levels, liver and kidney discoloration, and histopathologic changes in the liver and kidneys.
Conclusions	The NOAEL was 1.0% (in diet) (approximately 274 mg/kg/day). The dogs showed effects only at the high dose (6%).
Data Quality	Reliable without restrictions [Klimisch reliability 1] Comparable to a guideline study.
References	Unpublished confidential business information. Diisononyl Adipate: 90-Day Dietary Administration in Dogs.
Other	Date last updated October 3, 2003.

Genetic Toxicity In vitro (CAS No. 33703-08-1)

Test Substance	Adipic acid, diisononyl ester
CAS Number	33703-08-1
Remarks	Purity was not specified
Method/guideline	OECD 471
Type of Study	Ames *Salmonella* Mutation Assay
Test System	Bacterial
GLP	Yes
Year	1982
Species/Strain	*Salmonella typhimurium* /TA98; TA100; TA1535; TA1537; TA1538
Metab. Activation	Arochlor-induced hamster and rat liver S9 mixture.
Concentrations	10, 50, 100, 500, and 1000 ug/plate.
Statist. Methods	A mutagenic response was defined as a greater than two-fold increase in the number of histidine-revertant colonies over the concurrent vehicle control value.
Remarks on Test Conditions	Concurrent positive control materials were benzo(a)pyrene (BAP) and N-methyl-N-nitro-nitrosoguanidine (MNG). The spontaneous reversion frequency for each strain was determined from concurrent untreated and solvent (acetone) controls. For test material evaluation, fresh bacterial stocks were exposed to graded doses of the test substance both in the presence and absence of exogenous metabolic activation mixture. Revertants were scored 72 hours after exposure. A toxicity pretest was conducted to determine the high dose level (1000 ug/plate).

Results	Negative
Remarks	The test substance was negative in all strains. No mutagenic activity was observed over a range of doses from 10 to 1000 ug/plate with or without metabolic activation. The positive and negative controls gave responses as expected.
Conclusions	The test substance was negative for mutagenic activity over a range of doses from 10 to 1000 ug/plate with or without metabolic activation.
Data Quality	Reliable without restrictions [Klimisch reliability 1]
References	McKee, R.H., Lington, A.W., and Traul, K.A. (1986). An Evaluation of the Genotoxic Potential of Di-isononyl adipate. *Environ. Mutagen*. 8(6):817-827.
Other	Date last updated October 3, 2003.

Genetic Toxicity In Vitro (CAS No. 33703-08-1)

Test Substance	Adipic acid, diisononyl ester
CAS Number	33703-08-1
Remarks	Purity was not indicated
Method/guideline	OECD 476
Type of Study	Mouse lymphoma mutagenesis assay
Test System	Mammalian cell
GLP	Yes
Year	1986
Species/Strain	Mouse lymphoma cells/L5178Y.
Metab. Activation	With and without Arochlor-induced rat liver S9 mixture.
Concentrations	5.6 to 100 μl/ml (with activation); 7.5 to 100 ul/ml (without activation).
Control Groups	Ethylmethane sulfonate (EMS) was used as a positive control in the assays without S9 activation. 7,12-Dimethylbenzanthracene (DMBA), which requires metabolic activation, was used as a positive control for assays with S9. The concurrent negative control was the vehicle (acetone).
Statist. Methods	A mutagenic response was defined as a greater than two-fold increase in the number of revertant colonies over the concurrent vehicle control value.
Remarks on Test Conditions	Suspension cultures of mouse lymphoma cells, heterozygous for thymidine kinase activity, were grown in Fisher medium for leukemic mouse cells supplemented with 0.1% pluronic and 10% heat-inactivated horse serum (F10P) and exposed to the test substance in the same medium. Treated cells were grown for 48 hours to allow mutation expression. Approximately 3 x 10^6 cells from each culture were then plated in medium containing 3 ug/ml triflourothymidine (TFT) to select mutant clones. Diluted cells from each culture were also seeded in plates without TFT to assess viability. Mutant and total colony counts at each dose level were determined by triplicate plating.
Results	Negative
Remarks	The test substance did not exhibit any evidence of genotoxic activity over the dose range tested, with or without metabolic activation. The positive and negative controls gave the appropriate responses as expected.

Conclusions	Under conditions of this study, diisononyl adipate was non-mutagenic in the mouse lymphoma assay with or without metabolic activation.
Data Quality	Reliable without restrictions [Klimisch reliability 1]
References	McKee, R.H., Lington, A.W., and Traul, K.A. (1986). An Evaluation of the Genotoxic Potential of Di-isononyl adipate. *Environ. Mutagen*. 8(6):817-827.
Other	Date last updated October 10, 2003.

Acute fish toxicity (CAS No. 33703-08-1)

Test Substance	Adipic acid, diisononyl ester (diisononyl adipate)
CAS Number	33703-08-1
Remarks	Purity was not indicated
Method/guideline	OECD 203. Fish Acute Toxicity Test (1992 guidelines)
Type (test type)	Semi-static (renewal)
Test System	Fish, freshwater
GLP	Yes
Year	1996
Species/Strain	Fish / Rainbow trout *(Oncorhynchus mykiss)*
Supplier	Thomas Fish Company, Anderson CA
Analyt. Monitoring	Yes. GC-FID quantitation of test substance in water accommodated fraction (WAF) solutions
Exposure period	96 hours
Statist. Methods	Not applicable
Remarks on Test Conditions	This study was carried out as limit test using water-accommodated fractions (WAF) generated at 100 mg/L nominal concentrations. WAF solutions (nominal 100 mg/L) were prepared by adding appropriate amount/volume of liquid test substance to 19.5 L of laboratory dilution water in 20 L carboy container and by stirring mixture (<10% vortex) for 24 hrs at room temp and allowing mixture to settle for 1 hr. WAF solution were removed by glass siphon tubing from the bottom of carboy. New WAF solutions were prepared daily for "renewals" of test vessels. Three replicates were prepared for the test treatment and the control group. There were 5 fish per replicate. Total of 15 fish for treatment and control. Test carried out in 4-liter vessels which were filled with WAF solution for treatment or dilution water for controls. Vessels were filled to minimize headspace. Daily renewal of WAF solution for treatment and dilution water for controls were carried out. Analysis to quantitate test material concentration in WAF samples (old and new) was carried out by GC-FID. Observations for mortality, abnormal behavior and appearance of fish were performed on replicate vessels at 3, 24, 48, 72 and 96 hrs. Diurnal light with approx 16 hr light and 8 hr dark; daylight intensity ranged from 578-580 Lux. Test temperature= 16 ± 1 ° C.; pH range was 7.2 to 8.6; Dissolved Oxygen ranged from 7.2 to 9.3 mg/L.
Results	Nominal test conc. Loading Level (mg/L) — Mortality (96h) Control — 0 100 — 0 LL50 > 2.6 mg/L (measured conc. test substance) LL50 > 100 mg/L (nominal WAF generated solutions)

Remarks	No mortality was observed in treatment group or controls during the 96 hr period. Fish mean total length = 27 mm; Mean wet weight = 0.130 gm.
Conclusions	No mortality was observed at 100 mg/L WAF (nominal concentrations) in which the measured water concentration was 2.6 mg/L (GC-FID). Data indicate that test material not expected to cause mortality at its maximal water solubility limit or saturated water concentration.
Data Quality	Reliable with restrictions [Klimisch reliability 2]. Limited acute fish toxicity study.
References	Unpublished confidential business information.
Other	Date last updated October 3, 2003.

Biodegradation (CAS No. 33703-08-1)

Test Substance	Adipic acid, diisononyl ester
CAS Number	33703-08-1
Remarks	Purity was not indicated
Method/guideline	OECD Guideline 301F (1993), Ready Biodegradability: Manometric Respirometry Test.
Test type	Aerobic Biodegradation
GLP	Yes
Year	1996
Test system	Exposure Period: 28 Days Inoculum: Activated Sludge, Domestic. Kinetics: Not Reported Biodegradation Products: Not Reported Analytical Monitoring: No
Test Conditions	Treatment replicates were prepared by combining glass-distilled water, a mineral substrate, pH buffer, activated sludge and the appropriate test substance. Three replicates of the test material and two replicates of positive control (sodium benzoate) were prepared and evaluated in 1L glass vessels. Oxygen consumed by microorganisms from the oxidation of the test substance was continuously monitored using an automated respirometer. Test flasks were continuously stirred for 28 days. Test temperature was 22 ± 1 °C. The pH was 6.0 at the end of the 28-day study. Concentrations for Test Substance was 53 mg/L for test substance. Concentration for Sodium Benzoate (positive control) was 50 mg/L
Results	Biodegradation was 73% in 28 days for the test material. Data indicated that the test material was readily biodegradable (met "10-day window" criteria). The degradation calculation was performed using the respirometry software and the Theoretical Oxygen Demand (ThOD) and the mass of the test substance added. ThOD based upon the elemental analysis of the test substance. The test substance was analyzed as 73% Carbon, 12% Hydrogen, and 14.8% Oxygen.
Conclusions	The test substance was readily biodegradable.

Data Quality	Reliable without restrictions [Klimisch reliability 1].
References	Unpublished confidential business information
Other	Date last updated October 10, 2003

Melting Point, Boiling Point, Vapor Pressure (CAS No. 27178-16-1)

Test Substance **CAS Number** **Remarks**	Adipic acid, diisodecyl ester 27178-16-1 Purity not specified
Method/guideline	Other, not specified
Test type **GLP** **Year**	Melting point, boiling point and vapor pressure Not specified Not specified
Remarks	Methods of determination were not given. Physical chemical properties were supplied by a member company to the ACC Aliphatic Esters Panel.
Conclusions	Melting Point -71 °C Boiling Point 239-246 °C (4 mm Hg) Vapor pressure 0.0013 mmHg (20 °C)
Data Quality	Not assignable [Klimisch reliability 4]. Secondary literature.
References	Unpublished confidential business information supplied to ACC Aliphatic Esters Panel
Other	Date last updated October 3, 2003.

Water solubility (CAS No. 27178-16-1)

Test Substance **CAS Number** **Remarks**	Adipic acid, diisodecyl ester 27178-16-1 Purity not specified
Method/guideline **Test type** **GLP** **Year**	Other. Slow-stir method for water solubility determination (Letinski et al. 2002) Water solubility Not specified 2002
Test conditions	Slow-stir method of Letinski et al. (2002) was used to avoid problems of emulsion and phase separation that may occur with the flask method (OECD 105) for water immiscible low solubility liquids. Slow-stir water solubility vessels consisted of glass water aspirator bottles (4 to 12 L) fitted with spigots fitted with short-length Tefzel tubing and glass stopper. The vessels were filled with carbon-treated well water and poisoned with 50 mg/L $HgCl_2$. Test material was added to water at a loading rate of 1 mg/L using a microliter syringe and mixture stirred quiescently with little or no visible vortex using magnetic stirrer with Teflon stir bar. Performed at 20 C in temp controlled laboratory incubator or environ chamber. Equilibration time for slow stir was between 10-15 days. Quiescent mixing was stopped one hr prior to sampling. Aliquots of bottom water sample were removed from the spigot port. Test material in water sample was extracted on solid phase extraction (SPE) apparatus using ODS extraction disks. Ethyl acetate containing internal standard (o-terphenyl) was used a

	solvent to elute test material off the SPE. Collected extracts were reduced to 0.5 ml volume before the test material was quantitated by GC-FID.
Remarks	This recent slow-stir technique for measuring water solubility was shown to be suitable for water insoluble materials like the adipate diesters. The water solubility data reported for several diesters in this paper are in good agreement with previously published data for adipates and phthalates.
Conclusions	Water solubility for adipic acid, diisodecyl ester was determined to be 4.4×10^{-5} mg/L (n=3).
Data Quality	Reliable without restrictions [Klimisch reliability 1].
References	Letinski DJ et al. (2002) Slow-stir water solubility measurements of selected alcohols and diesters. Chemosphere, **48:** 257-265.
Other	Date last updated October 17, 2003.

Acute Oral Toxicity (CAS No. 27178-16-1)

Test Substance	Adipic acid, diisodecyl ester
CAS Number	27178-16-1
Remarks	Purity not indicated
Method/guideline	Other, not indicated
Test type	Acute oral
GLP	Not specified
Year	1976
Test system	Species: Rats; Dosage: Oral gavage, undiluted test substance administered
Conclusions	The acute oral LD_{50} for the test substance was 20.5 g/kg
Data Quality	Not assignable [Klimisch reliability 4] Secondary literature.
References	A. Takahashi, Problems with hygiene maintenance for food coming in contact with rubber and plastic products, Int. Takahashi Amer. Sci. Technol. **3:** 93-105 (1976)
Other	Date last updated October 3, 2003.

Biodegradation (CAS No. 27178-16-1)

Test Substance	Adipic acid, diisodecyl ester
CAS Number	27178-16-1
Remarks	Purity was not indicated
Method/guideline	OECD Guideline 301F (1993), Ready Biodegradability: Manometric Respirometry Test.
Test type	Aerobic Biodegradation
GLP	Yes
Year	2001

Test system	Exposure Period: 28 Days Inoculum: Activated Sludge, Domestic. Kinetics: Not Reported Biodegradation Products: Not Reported Analytical Monitoring: No
Test Conditions	Treatment replicates were prepared by combining glass-distilled water, a mineral substrate, pH buffer, activated sludge and the appropriate test substance. Three replicates of the test material and two replicates of positive control (sodium benzoate) were prepared and evaluated in 1L glass vessels. Oxygen consumed by microorganisms from the oxidation of the test substance was continuously monitored by an automatic respirometer instrumentation. Test flasks were continuously stirred for 28 days. Test temperature was 22 ± 1 °C. The pH, as measured at termination, was 7.2. Concentrations for Test Substance was 50.17 mg/L (mean) for test substance. Concentration for Sodium Benzoate (positive control) was 48.09 mg/L
Results	Test substance Biodegradation was 76.46 % in 28 days; the "10-day window" criterion for OECD ready biodegradability was met. Sodium benzoate (positive control) was also determined to be readily biodegradable. The degradation calculation was performed using the respirometry software and the Theoretical Oxygen Demand (ThOD) and the mass of the test substance added. ThOD (2.79 calculated) based upon the elemental analysis of the test substance. The test substance was analyzed as 73.19% Carbon, 12.04% Hydrogen, and 13.94% Oxygen.
Conclusions	Test substance was readily biodegradable.
Data Quality	Reliable without restrictions [Klimisch reliability 1].
References	Unpublished confidential business information
Other	Date last updated October 3, 2003

Acute Oral Toxicity CAS No. 16958-92-2)

Test Substance	Adipic acid, ditridecyl ester
CAS Number	16958-92-2
Remarks	Purity not indicated
Method/guideline	Other, not specified
Test type	Acute oral
GLP	No
Year	1978
Test system	Species (Strain) Rats (Sherman-Wistar) Sex: Male and female No. of animals: 5/sex/treatment Route: Oral gavage
Test conditions	Remarks: Single oral administration of 16.0 g/kg; no controls; feeding *ad libitum* but food was withheld ~24 h prior to dosing. Mortality/clinical signs were observed daily for 14 days.

Results	Oral LD_{50} > 16 g/kg Statist. Methods. Not specified.
Remarks	No mortality was reported in either the female and male groups of animals dosed at 16 g/kg. No measurements for body weight or clinical signs were reported. No necropsy was performed.
Conclusions	The acute oral LD_{50} for the test substance was > 16 g/kg.
Data Quality	Reliable with restrictions [Klimisch reliability 2]. Report was limited. Study was not GLP.
References	Unpublished confidential business information
Other	Date last updated October 10, 2003.

Acute Oral Toxicity CAS No. 16958-92-2)

Test Substance	Adipic acid, ditridecyl ester
CAS Number	16958-92-2
Remarks	Purity not indicated
Method/guideline	Other, not specified
Test type	Acute oral
GLP	No
Year	1978
Test system	Species (Strain) Rats (Wistar), weight 200-300 g. Sex: Male and female No. of animals: 5/sex/treatment Route: Oral gavage
Test conditions	Remarks: Single oral administration of 15.0 g/kg; no controls; feeding *ad libitum* but food was withheld ~18 hr prior to dosing. Clinical signs were observed for 14 days.
Results	Oral LD_{50} > 15.0 g/kg Statist. Methods. Not specified.
Remarks	No mortality was reported in either the female and male groups of dosed animals. Clinical signs reported in both sexes were: diarrhea, lethargy, flaccid, body oily, ptosis and chromorhinnorrhea. No measurements of body weight or necropsy were performed.
Conclusions	The acute oral LD_{50} for the test substance was > 15.0 g/kg.
Data Quality	Reliable with restrictions [Klimisch reliability 2]. Report was limited. Study was not GLP.
References	Unpublished confidential business information
Other	Date last updated October 10, 2003.

Acute Dermal Toxicity CAS No. 16958-92-2)

Test Substance	Adipic acid, ditridecyl ester
CAS Number	16958-92-2
Remarks	Purity not indicated
Method/guideline	16 CFR 1500.40
Test type	Acute dermal
GLP	No
Year	1973
Test system	Species: Rabbits, sex and age not indicated No. of animals: 3 animals Route: Dermal application
Test conditions	Remarks: Dermal application at 2.0 g/kg body weight. Mortality was observed daily for 14 days.
Results	Dermal LD_{50} > 2.0 g/kg Statist. Methods. Not specified.
Remarks	No mortality was reported in the three dosed animals. No measurements of body weight, clinical examination or necropsy were performed.
Conclusions	The acute dermal LD_{50} for the test substance was > 2.0 g/kg.
Data Quality	Not Reliable. [Klimisch reliability 3]. Only 3 animals used instead of standard 10 (five of each sex). Does not meet criteria of standard methods. Study was not GLP.
References	Unpublished confidential business information
Other	Date last updated October 3, 2003.

Acute Dermal Toxicity CAS No. 16958-92-2)

Test Substance	Adipic acid, ditridecyl ester
CAS Number	16958-92-2
Remarks	Purity not indicated
Method/guideline	Other, not indicated
Test type	Acute dermal
GLP	No
Year	1978
Test system	Species (Strain) Rabbits (New Zealand white), weight 1.9-1.5 kg No. of animals: 10 animals Route: Dermal application
Test conditions	Remarks: Dermal application to the abraded skin at 5.0 g/kg bw (no vehicle under semi-occlusive dressing for 24 h); no controls. Mortality/clinical signs were observed daily for 14 days. Body weights on taken on day 0 and 14.

Results	Dermal LD_{50} > 5.0 g/kg Statist. Methods. Not specified.
Remarks	No mortality was reported in the any of the dosed animals during days 0-14. Body weight gain over the 14 day period appeared to be treatment related. No measurements of body weight were performed on day 7. Clinical signs were observed and consisted of erythema, edema, diarrhea, emaciation, lethargy and bloated abdomen. Sex and age of animals not indicated.
Conclusions	The acute dermal LD_{50} for the test substance was > 5.0 g/kg.
Data Quality	Not assignable [Klimisch reliability 4]. The test was performed on abraded skin. Since OECD 402 requires a test on intact skin, the results of this study are considered to be not assignable.
References	Unpublished confidential business information
Other	Date last updated October 10, 2003.

Repeated Dose Toxicity CAS No. 16958-92-2)

Test Substance	Adipic acid, ditridecyl ester
CAS Number	16958-92-2
Remarks	Purity not indicated
Method/guideline	Other, similar to OECD 411 guideline
Test type	13-week subchronic dermal study
GLP	No
Year	1988
Species/strain	Rat (Sprague Dawley), 6.5-7 weeks old
Route of Administ.	Dermal administration
Duration of test	13 weeks
No. of animals	10/sex/dose level
Dose/Conc. Levels	0, 800 and 2000 mg/kg bw (no vehicle) on the clipped dorsal skin
Sex	Female and male
Frequency of treatment	Dermal application with neat material, 5 days/wk for 13 wks
Control Group	Yes
Post-exposure observat.	Toxicity was assessed by clinical observations including for dermal irritation.
Statist. Methods	Dunnett's test, Duncan's Multiple Range test, chi-square distribution.
Remarks on Test Conditions	Subchronic dermal study was similar to requirements in the OECD 411 guideline. Toxicity was assessed by mortality, clinical observations, body weight measurements, organ weight, serum chemistry, hematology, necropsy, gross and histopathology, sperm morphology. A radiotracer study to determine extent of dermal absorption using C_{14}-radiolabelled test substance was also carried out on a separate supplementary set of animals.
Results/Remarks	Investigators of study concluded that test substance did not cause systemic toxicity when administered dermally for 13 weeks at daily doses of 800 and 2000 mg/kg/bw. No dose response treatment-related effects seen in sperm morphology, uterus or epididymides weight changes, urinalysis or necropsy. The effects on organ weights for liver and kidney seen were considered as adaptive responses and not a reflection of toxicity. Microscopic histopathological examination did not reveal treatment-related changes in the kidneys or livers. The application of test substance had minimal effects on the skin

	with only slight erythema (redness) and flaking of the skin being observed. Results from the radiotracer study indicated that the test substances showed relatively low dermal absorption (only 10% of the radiolabelled dose absorbed).
Conclusions	No systemic toxicity in any of the two doses tested. Doses of 800 and 2000 mg/kg were well-tolerated by animals. Minimal effects on skin were only slight erythema and flaking of skin. NOAEL could not be estimated from this study.
Data Quality	Reliable with restrictions [Klimisch reliability 2] Limited information; study was non-GLP.
References	Unpublished confidential business information. Thirteen week dermal administration study in rats.
Other	Date last updated October 10, 2003.

Genetic Toxicity In Vitro (CAS No. 16958-92-2)

Test Substance	Adipic acid, ditridecyl ester
CAS Number	16958-92-2
Remarks	Purity was not indicated
Method/guideline	Other, not indicated but procedure similar to OECD 471
Type of Study	Ames *Salmonella* Microsome plate test
Test System	Bacterial
GLP	No
Year	1978
Species/Strain	*Salmonella typhimurium* /TA98; TA100; TA1535; TA1537; TA1538
Metab. Activation	Rat liver S9 mix (Aroclor-induced)
Concentrations	0.01, 0.10, 1, 5 and 10 µl/plate
Statist. Methods	A mutagenic response was defined as a reproducible, dose-related increase in the number of histidine-independent colonies over the spontaneous incidence.
Remarks on Test Conditions	Negative control was the vehicle solvent, DMSO. The positive controls were: ethylmethanesulfonate (TA1535, TA100), QM (TA1537), nitrofluorene (TA1538, TA98), all strains without S9; aminoanthracene, all strains with S9. Plating was not done in duplicate or triplicate, but once.
Results	Negative.
Remarks	Negative results were observed in all five tester strain of *Salmonella typhimurium* with or without activation. The positive controls gave the expected responses.
Conclusions	The test substance was not mutagenic in all the five Salmonella strains, with and without metabolic activation.
Data Quality	Reliable without restrictions [Klimisch reliability 2]. Study was non-GLP.
References	Unpublished confidential business information.
Other	Date last updated October 10, 2003.

Genetic Toxicity In Vivo (CAS No. 16958-92-2)

Test Substance	Adipic acid, ditridecyl ester
CAS Number	16958-92-2
Remarks	Purity was 100%
Method/guideline	Other, similar to procedures in OECD 474
Type of Study	In vivo micronucleus assay
Test system	Bone marrow and peripheral blood cells
GLP	No
Year	1986
Species/Strain	Rat (Sprague Dawley), 6.5-7 weeks old
Sex	Female and male
No. of animals	10/sex/dose level
Route of Administ.	Dermal administration
Doses/conc. levels	0, 800 and 2000 mg/kg bw (no vehicle) on the clipped dorsal skin; untreated controls..
Exposure period	13-week dermal (5 days/week). No positive controls.
Statist. Methods	ANOVA, Tukey's test, Sheffe's test, linear regression
Remarks on Test Conditions	Age at study initiation: 6.5-7 weeks old Sampling time: at necropsy, bone marrow and peripheral blood were collected. Mature red blood cells (normochromatic erythrocytes, NCE) and immature red blood cells (polychromatic erythrocytes, PCE) were evaluated for cytotoxicity and micronuclei formation. Criteria for scoring: for each animal, the following proportions were determined in bone marrow (4 smears/animal) and peripheral blood (3 slides/animal). Ratio of PCE to NCE, micronucleated PCE per 1000 PCE and micronucleated NCE per 1000 NCE were evaluated.
Results	No mortality in any of treated animals. For bone marrow and peripheral, there were not treatment related effects in PCE/NCE, MNCE (% of PCE) and MPCE (% of PCE) for the treated animals relative to the untreated controls. Test material was not cytotoxic to red blood cell formation nor did it induce any statistically significant increase in the fornation of micronucleated PCEs or NCEs in bone marrow or peripheral blood cells in dermally-treated rats.
Remarks	Due to the use of animals from a 13-week dermal toxicity study, it was not possible to include positive controls, as is recommended by OECD 474. The interval between the last dosing time and the collection of blood and bone marrow was not indicated. The high dose was above the 1000 mg/kg indicated as a maximum dose by test guidelines. Minor comments include the proportion of MPCE was determined for 1000 PCE. This is in agreement with OECD 474 (1983) at the time of this study. Note that current OECD 474 guidelines (1997) recommend evaluation of 2000 PCE.
Conclusions	Not clastogenic.
Data Quality	Reliable without restrictions [Klimisch reliability 1]
References	Unpublished confidential business data.
Other	Date last updated October 10, 2003.

Reproductive Toxicity (CAS No. 16958-92-2)

Test Substance	Adipic acid, ditridecyl ester
CAS Number	16958-92-2
Remarks	Purity not indicated
Method/guideline	Other, similar to OECD 411 guideline
Test type	13-week subchronic dermal study
GLP	No
Year	1988
Species/strain	Rat / Sprague Dawley), 6.5-7 weeks old
Route of Administ.	Dermal administration
Duration of test	13 weeks
No. of animals	10/sex/dose level
Dose/Conc. Levels	0, 800 and 2000 mg/kg bw (no vehicle) on the clipped dorsal skin
Sex	Female and male
Frequency of treatment	Dermal application with neat material, 5 days/wk for 13 wks
Control Group	Yes
Post-exposure observat.	Toxicity was assessed by clinical observations including for dermal irritation.
Statist. Methods	Dunnett's test, Duncan's Multiple Range test, chi-square distribution.
Remarks on Test Conditions	Subchronic dermal study was similar to requirements in the OECD 411 guideline. Toxicity was assessed by mortality, clinical observations, body weight measurements, organ weight, serum chemistry, hematology, necropsy, gross and histopathology, sperm morphology.
Results	No histopathological effect or change in tissue organ weight were observed in reproductive tissues, sperm morphology, epididymides or uterus weight after 13-week dermal administration study in female and male rats (at doses of 800 and 2000 mg/kg/d) .
Conclusions	No effect on reproductive organs as evidenced by histopathology, tissue weight changes (epididymides, uterus), sperm morphology.
Data Quality	Reliable with restrictions [Klimisch reliability 2] Limited information; study was non-GLP
References	Unpublished confidential business information. Thirteen week dermal administration study in rats.
Other	Date last updated October 10, 2003.

Reproductive/Developmental Toxicity (CAS No. 16958-92-2)

Test Substance	Adipic acid, ditridecyl ester
CAS Number	16958-92-2
Remarks	Purity not indicated
Method/guideline	Other, not indicated
Test type	Reproduction/developmental toxicity screen
GLP	No
Year	1988
Species/strain	Rat / Sprague Dawley), 11 weeks old, mean weight 235-240 g
Route of Administ.	Dermal administration
Duration of test	20 days

Sex, No. of animals	15 mated females/treatment
Dose/Conc. Levels	Dermal administration of at 0, 800 and 2000 mg/kg bw (no vehicle) on the clipped dorsal skin; untreated controls
Frequency of treatment	Daily from Gestation Day 0 to 19, inclusive
Control Group	Yes, untreated controls
Statist. Methods	ANOVA, Fisher's Exact test, Dunnett's test
Remarks on Test Conditions	Female rats were mated with untreated males (1/1) from the same strain. The day of observation of a vaginal plug and spermatozoa in the vaginal lavage fluid was defined as day 0 of gestation. Females were treated daily from day 0 to 19 of gestation inclusive. Mortality/clinical symptoms of dams were noted daily from day 0 to 20. Body weight / food consumption was recorded on day 0 (body weight only), 3, 6, 10, 13, 16 and 20. All females were subjected to macroscopic examination on day 20. The uteri were removed, weighed and examined for number of corpora lutea, number of implantation sites and number and location of fetuses and resorptions. Fetuses were inspected on total number, sex, weight, length and external, visceral (½ of fetuses by the modified Wilson technique) and skeletal (½ of fetuses, cartilage and bone) defects. Blood was withdrawn on day 20 for clinical chemistry.
Results	Maternal data: No maternal mortality was observed at any of the doses. There were no treatment related effects in uterus weight, number of corpora lutea/implantation site/dam, pre-/post-implantation loss/resorptions and number of live fetuses/dam in the treated animals relative to the controls. While clincal chemistry differences were reported for treated animals, the investigator of study noted that alanine transferase, glucose, cholesterol and iron levels were within the range of historical controls. There were no gross lesions observed in the tissues collected at necropsy. Fetal data: No treatment-related effects or differences observed in fetal weight/length, external examination/sex and there were no skeletal anomalies in fetuses compared to controls. Viceral anomalies included increased incidence of levocardia at 2000 mg/kg/day. However, subsequent studies with larger number of pregnant animals (n=25) did not showed visceral anomalies or levocardia. No developmental toxicity was observed in the follow-up study at 2000 mg/kg/day.
Remarks	Dermal administration of the test substance did not adversely affect parameters of reproductive performance during gestation nor did it adversely affect in utero survival and development of concepti. .
Conclusions	NOAEL for developmental/reproductive effects: 800 mg/kg No developmental toxicity observed after dermal administration. No treated related effects on reproduction.
Data Quality	Reliable with restrictions [Klimisch reliability 2]. Limited screening study.
References	Unpublished confidential business information.
Other	Date last updated October 3, 2003.

Developmental Toxicity (CAS No. 16958-92-2)

Test Substance	Adipic acid, ditridecyl ester
CAS Number	16958-92-2
Remarks	Purity was not indicated
Method/guideline	Other, not indicated
Test type	Developmental toxicity screen
GLP	No

Year	1990
Species/strain	Rat / Sprague Dawley, 11 weeks old, mean weight 231-235 g
Route of Administ.	Dermal administration
Duration of test	20 days
Sex, No. of animals	25 mated females/treatment
Dose/Conc. Levels	Dermal administration of at 0 and 2000 mg/kg bw (no vehicle) on the clipped dorsal skin; untreated controls
Frequency of treatment	Daily from Gestation Day 0 to 19, inclusive
Control Group	Yes, untreated controls
Statist. Methods	ANOVA, Fisher's Exact test, Dunnett's test, visceral data by ANOVA followed by Bartlett's test
Remarks on Test Conditions	Female rats were mated with untreated males (1/1) from the same strain. The day of observation of a vaginal plug and spermatozoa in the vaginal lavage fluid was defined as day 0 of gestation. Females were treated daily from day 0 to 19 of gestation inclusive. Mortality/clinical symptoms of dams were noted daily from day 0 to 20. Body weight was recorded on day 0, 6, 10, 16 and 20. All females were subjected to macroscopic examination on day 20. The uteri were removed, weighed and examined for number of corpora lutea, number of implantation sites and number and location of fetuses and resorptions. Fetuses were inspected on total number, sex, weight, external and visceral defects (½ of fetuses by the modified Wilson technique and ½ of fetuses by Staples technique). Visceral examination was performed blind.
Results	Maternal data: No maternal mortality was observed at any of the doses. There were no treatment related effects in uterus weight, number of corpora lutea/implantation site/dam, pre-/post-implantation loss/resorptions and number of live fetuses/dam in the treated animals relative to the controls. There were no treatment related effects or gross lesions observed in the tissues collected at necropsy. Fetal data: There were no treatment-related effects on viceral anomalies examined using the modified Wilson and Staples techniques. There was no evidence of levocardia or other visceral anomalies observed in this study carried out with larger number of pregnant animals.
Conclusions	No developmental toxicity was observed and there was no levocardia or other visceral anomalies observed in the fetuses in this study with a larger number of pregnant animals (n=25).
Data Quality	Reliable with restrictions [Klimisch reliability 2]. Limited screening study.
References	Unpublished confidential business information.
Other	Date last updated October 27, 2003.

Acute fish toxicity (CAS No. 16958-92-2)

Test Substance	Adipic acid, ditridecyl ester
CAS Number	16958-92-2
Remarks	Purity 100% indicated
Method/guideline	Not specified
Type (test type)	Static 96-hr acute fish toxicity
Test System	Fish, saltwater
GLP	No
Year	1986

Species/Strain	Fish, sheepshead minnow (*Cyprinodon variegatus*)
Analyt. Monitoring	No analysis performed
Exposure period	96 hours
Statist. Methods	Binominal probability analysis [Stephan CE, ASTM STP 634, pp. 65-84 (1977)]
Remarks on Test Conditions	Sheepshead minnow, weight 0.3-0.4 g, No. of fish: 20/treatment group Nominal concentrations: 500, 1000, 2500 and 5000 mg/L, untreated control 96-h static test performed in 40 L glass aquaria containing 30 L synthetic seawater (salinity 20±1 ppt) at 22±2°C, 16 h light, unfed. The test substance (oil) was maintained in suspension by a propeller above the system which created a vortex of 0.6-1.3 cm. Observations for mortality, abnormal behavior and appearance of fish were performed at 0, 24, 48, 72 and 96 hrs. Daily physical measurement of pH, dissolved oxygen, temp, salinity; overall ranges for pH 8.1-8.2; O_2 92-106%; temperature 21-22°C, salinity 20 ppt.
Results	Nominal test conc. Loading Level (mg/L) — Mortality (96h) Control (untreated) — 0 500 — 0 1000 — 0 2500 — 5 5000 — 20
Remarks	Because the test substance is not soluble in water, it was kept dispersed as a suspension in water using a propeller situated above the water surface. The LC50 was determined based on nominal loading rate concentrations. Diesel oil (300 mg/L nominal conc.) was also run for relative comparison and was shown to cause 15% mortality.
Conclusions	96-h LC_{50} >5000 mg/L (nominal conc.). Test substance would not be expected to cause mortality in fish at its water saturation limit.
Data Quality	Reliable with restrictions [Klimisch reliability 2]. Study was carried out as using oil-water dispersion technique for lubricant product. Not GLP.
References	Unpublished confidential business information.
Other	Date last updated October 10, 2003.

Acute Toxicity to Aquatic Invertebrates (CAS No. 16958-92-2)

Test Substance	Adipic acid, ditridecyl ester
CAS Number	16958-92-2
Remarks	Purity was not indicated
Method/guideline	OECD 202, EU Guideline 67/548/EEC, DIN 38412
Type (test type)	Acute immobilization test of Daphnia sp.
Test System	*Daphnia magna*
GLP	No
Year	1997
Species/Strain	Freshwater Invertebrate, *Daphnia magna* < 24 hr old.
Analyt. Monitoring	No analysis performed

Exposure period **Statist. Methods**	24 hours No specified
Remarks on Test Conditions	24 h static test at 20±1°C in reconstituted water, 16 h light, unfed, O_2 >60% Number of daphnids used per treatment group was not specified Nominal concentrations of 0.6, 0.8, 1.1, 1.6, 2.3, 3.3, 4.6, 6.5, 9.2 and 13 g/L (10 % emulsifier used but emulsifier controls were not toxic to daphnids, untreated controls, emulsifier controls (1.3 g/L). Observation for daphnids immobilized was performed at 24 hr. Measurement of pH not specified. Dissolved oxygen was >60% of control. Temp was 20±1°C.
Results	% Immobilization of Daphnids at 24 hr Nominal Conc. / % Immobilized / Nominal Conc. / % Immobilized Control 0 3.3 g/L 45 0.6 g/L 0 4.6 50 0.8 0 6.5 60 1.1 5 9.2 65 1.6 20 13 80 2.3 30
Remarks	The information was essentially confined to what is included in the above summary. No information on pH and number of organisms used was supplied in the report. No analyses were performed on water samples to determine concentration of the test substance. The EC_{50} value was estimated based on cited nominal concentrations. According to OECD 202 the concentration of emulsifiers not recommended to exceed 0.1 g/L. In the current test, the concentration of emulsifier is >0.1 g/L at nominal concentrations 1.1-13 g/L). However, the emulsifier controls were reported to be not toxic against *Daphnia* at the conc used and this is acceptable. In the emulsified water solutions tested, the test material is expected to at its water saturation limits given the poor water solubility of this diester. Potassium dichromate was run as positive control and was determined to have a EC_{50} value of 1.5 mg/L.
Conclusions	24-hr EC_{50} was estimated to be 4.8 g/L or 4800 mg/L (graphically determined) based on the observed immobilization data. Test substance not expected to cause immobilization at its water saturation limit.
Data Quality	Reliable with restrictions [Klimisch reliability 2]. Study was not GLP and limited to 24 hr EC_{50}.
References	Unpublished confidential business information.
Other	Date last updated October 10, 2003.

Acute Toxicity to Aquatic Invertebrates (CAS No. 16958-92-2)

Test Substance	Adipic acid, ditridecyl ester
CAS Number	16958-92-2
Remarks	Purity was 100%
Method/guideline	Not indicated
Type (test type)	Acute Toxicity to the brown shrimp (*Crangon crangon*)
Test System	Brown shrimp (*Crangon crangon*)
GLP	No
Year	1986
Species/Strain	Brown shrimp (*Crangon crangon*) mean weight 0.7 g

Analyt. Monitoring **Exposure period** **Statist. Methods**	No chemical analysis performed on test substance 24 hours Binominal probability analysis [Stephan CE, ASTM STP 634, pp. 65-84 (1977)]
Remarks on Test Conditions	96-hr semi-static test (renewals at 24 and 48 h) under continuous agitation in cylindric glass vessels containing 16 L seawater (salinity 35 ppt, pH 8.2), unfed; loading 0.9 g/L. No. of shrimp: 20/treatment group Nominal: 5600 and 10000 mg/L, untreated controls. Observation of mortality was performed at 24, 48, 72 and 96 hr. Measurement of pH, dissolved oxygen and temp were taken. Overall ranges for pH 8.2-8.9; O_2 89-98%; temperature 15-16 °C.
Results	Nominal Conc. — % Mortality 0 (untreated) — 10 5600 mg/L — 0 10000 — 5
Remarks	No chemical analysis was performed. LC_{50} was based on nominal concentrations. During the test 0-25% organisms per treatment reported to have jumped out of the vessel, so the test vessels used were actually not appropriate for this test. Further 0-10% organisms per treatment were eaten; this could be due to the fact that the organisms were not fed during the study. *Crangon crangon* is not the species recommended by the guideline OPPTS 850.1035. The temperature used in this study is not in accordance with the guideline (15-16°C, OPPTS 850.1035: 25±2°C). This could be related to the species used in this test. Light regime was not reported (OPPTS 850.1035: 14 h light), salinity was relatively high (35 ppt, OPPTS 850.1035: 20±3 ppt).
Conclusions	96-hr LC_{50} was > 10,000 mg/L (nominal conc.). Test substance would not be expected to cause mortality at its water saturation limit.
Data Quality	Not reliable [Klimisch reliability 3]. Test results may not be as reliable due to some of the remarks and limitations discussed.
References	Unpublished confidential business information.
Other	Date last updated October 10, 2003.

Biodegradation (CAS 16958-92-2)

Test Substance **CAS Number** **Remarks**	Adipic acid, ditridecyl ester 16958-92-2 Purity 100% was indicated
Method/guideline	EPA 560/6-82-003 (equivalent to OECD 301B methodology) Shake Flask Aerobic Biodegradation - CO_2 evolution method using non-acclimated inoculum
Test type **GLP** **Year**	Aerobic Biodegradation - CO_2 evolution method No 1993
Test system	Exposure Period: 28 Days Inoculum: Activated Sludge, Domestic, Unacclimated. Kinetics: Not Reported Biodegradation Products: Not Reported Analytical Monitoring: CO_2 evolution monitored in traps containing base solution.

Test Conditions	Inoculum: Activated sludge obtained from wastewater treatment plant. Amount inoculum used was 30 mg solids/L. Duplicate flasks Treated [medium + inoculum + test material (10 mg C/l)]; Duplicate flasks Positive Control [medium + inoculum + Rapeseed oil (10 mg C/l))]; Duplicate Blank Control [medium + inoculum]. Incubation was performed under continuous shaking in 2L flasks, containing 1L of medium, test substance and/or inoculum at 25±3 ^{0}C in the dark. Evolved CO_2 was collected in appropriate trap containing 10 ml 0.2N KOH. CO_2 was monitored at various time points over a period of 28 days. Flask CO_2 traps were sampled at days 2, 5, 9, 14, 22 and 28. The amount of CO_2 was determined in the traps by back titration with 0.2N HCl, after addition of $Ba(Cl)_2$ and indicator. One day prior to the final sampling, the medium was acidified with 1 ml of concentrated sulfuric acid. Blank controls were used to substract for background CO_2 production. Concentrations for Test Substance was 10 mg C /L for test substance. Concentration for rapeseed oil (positive control) was 10 mg C/L.
Results	**Biodegradation Results:** % Biodegradation [% of ThCO2] mean value **Day 2 5 9 14 22 29** Test Material 3.6 18 31 41 53 57 Positive Control (rapeseed oil) 16 57 68 74 79 79 Test material did not meet "10-day window" criteria for ready biodegradability. Positive controls achieved 79% biodegradation in 28 days and met the "readily biodegradable" criteria.
Conclusions	Biodegradation was 57% in 28 days. The test substance was not readily biodegradable.
Data Quality	Reliable with restrictions [Klimisch reliability 2]. Not GLP. Test method used was essentially equivalent to OECD 301B test method.
References	Unpublished confidential business information
Other	Date last updated October 10, 2003

Biodegradation (CAS 16958-92-2)

Test Substance **CAS Number** **Remarks**	Adipic acid, ditridecyl ester 16958-92-2 Purity was not indicated
Method/guideline	EPA Shake Flask Method 44(53): A.4.51 (1979) (equivalent to OECD 301B methodology) Shake Flask Aerobic Biodegradation - CO_2 evolution method using non-acclimated inoculum
Test type **GLP** **Year**	Aerobic Biodegradation - CO_2 evolution method No 1990
Test system	Exposure Period: 28 Days Inoculum: Activated Sludge, Domestic, Unacclimated. Kinetics: Not Reported Biodegradation Products: Not Reported

Test Conditions	Analytical Monitoring: CO_2 evolution monitored in traps containing base solution. Inoculum: Activated sludge obtained from wastewater treatment plant. Duplicate flasks Treated [medium + inoculum + test material (10 mg C/l)]; Duplicate flasks Positive Control [medium + inoculum + Rapeseed oil (10 mg C/l))]; Duplicate Blank Control [medium + inoculum]. Incubation was performed under continuous shaking in 2L flasks, containing 1L of medium, test substance and/or inoculum at 25±3 ^{0}C in the dark. Evolved CO_2 was collected in appropriate trap containing 10 ml 0.2N KOH. CO_2 was monitored at various time points over a period of 28 days. Flask CO_2 traps were sampled at days 2, 5, 8, 12, 16, 21 and 28. The amount of CO_2 was determined in the traps by back titration with 0.2N HCl, after addition of $Ba(Cl)_2$ and indicator. One day prior to the final sampling , the medium was acidified with 1 ml of concentrated sulfuric acid. Blank controls were used to subtract for background CO_2 production. Concentrations for Test Substance was 10 mg C /L for test substance. Concentration for rapeseed oil (positive control) was 10 mg C/L.
Results	**Biodegradation Results:** % Biodegradation [% of ThCO2] mean value

Day	**2**	**5**	**8**	**12**	**16**	**21**	**28**
Test Material	3.9	11	25	34	39	48	60
Positive Control (rapeseed oil)	21	46	58	65	69	72	74

	Test material did not meet "10-day window" criteria for ready biodegradability. Positive controls achieved 74% biodegradation in 28 days and met "readily biodegradable" criteria. .
Conclusions	Biodegradation was 60% in 28 days. The test substance was not readily biodegradable.
Data Quality	Reliable with restrictions [Klimisch reliability 2]. Not GLP. Test method used was essentially equivalent to OECD 301B test method.
References	Unpublished confidential business information
Other	Date last updated October 10, 2003

Melting Point, Boiling Point, Vapor Pressure (CAS No. 103-24-2)

Test Substance	Azelaic acid, bis(2-ethylhexyl) ester
CAS Number	103-24-2
Remarks	Purity not indicated
Method/guideline	Other, not specified
Test type	Melting point, boiling point and vapor pressure
GLP	Not specified
Year	Not specified
Remarks	Methods of determination were not given. Physical chemical properties were summarized for two azelate ester derivatives in Patty's Toxicology reference book (David et al. 2001).
Conclusions	Melting Point - 78 °C Boiling Point 237 °C (5 mm Hg) Vapor Pressure 5 mm Hg (237 °C)

Data Quality	Not assignable [Klimisch reliability 4]. Secondary literature.
References	David RM, et al. (2001). Esters of aromatic mono-, di-, and tricarboxylic acids, aromatic diacids and di-, tri-, or polyalcohols *in* Patty's Toxicology, 5th edition, Bingham E, et al. (eds.), Vol. 6, Chapter 80, pp. 635-932. J. Wiley, New York. Cited in Table 80.13 , pg. 740.
Other	Date last updated October 17, 2003.

Acute Oral Toxicity (CAS No. 103-24-2)

Test Substance	Azelaic acid, bis(2-ethylhexyl) ester
CAS Number	103-24-2
Remarks	Purity not indicated
Method/guideline	Other, not specified
Test type	Acute oral toxicity
GLP	No
Year	1962
Test system	Species (Strain) Rat (Carworth-Wistar) Sex: Male, Weight 90-120 g, 4-5 weeks of age No. of animals: 5/treatment Route: Oral gavage
Test conditions	Remarks: Single oral administration (gavage), dose levels not given. Vehicle was not indicated. Dose volume information not given. Use of control group not specified. Animals were not fasted. Mortality was observed over 14 days.
Results	Oral LD_{50}: 8.72 ml/kg Statist. Methods. Thompson, Weil
Remarks	No measurement/observation for clinical signs, body weights, food consumption and necropsy were cited in this literature report. Mortality results for test material were not cited.
Conclusions	The acute oral LD_{50} for the test substance was 8.72 ml/kg.
Data Quality	Not assignable [Klimisch reliability 4] Secondary literature. Range-finding study; limited number of animals.
References	H.F. Smyth, C.F. Carpenter, C.S. Weil, et al. Range-finding toxicity data: List VI. Amer. Ind. Hyg. Assoc. J. **23:** 95-107 (1962).
Other	Date last updated October 17, 2003.

Acute fish toxicity (CAS No. 103-24-2)

Test Substance	Azelaic acid, bis(2-ethylhexyl) ester
CAS Number	103-24-2
Remarks	Purity was not specified
Method/guideline	OECD 203, ECC L383 92/69 C1 (1992), 92/69/EWG

Type (test type) **Test System** **GLP** **Year**	Static 96-hr acute fish toxicity Fish, freshwater Yes 1998
Species (Strain) **Analyt. Monitoring** **Exposure period** **Statist. Methods**	Carp (*Cyprinus carpio*), mean length 20 ± 1 mm. No chemical analysis performed 96 hours Not specified
Remarks on Test Conditions	96-h static test performed in 3-4 L glass vessels with ISO medium solution (pH 8.1, hardness 250 mg/L $CaCO_3$); 1.5-2.5L medium, 20-21°C; aerated, 16 hr light, unfed. No. of fish: 3/treatment for 1, 10, 100 and 1000 mg/L WAF; 7/treatment for 10000 mg/L and for untreated controls. Concentrations: Water accommodated fractions (WAFs) were prepared at nominal 1, 10, 100, 1000 and 10000 mg/L loading rates, untreated controls (0 mg/L). Observations for mortality of fish were performed at 2, 24, 48, 72 and 96 hrs. Daily physical measurement of pH, dissolved oxygen; temp. Overall ranges for temperature 20-21°C, pH 7.3-8.1; pH 7.3-8.1 (also in 10000 mg/L); O_2 74-100% (in all vessels), except in the 10000 mg/L vessel at day 2); O_2 36%.
Results	Nominal test conc. (mg/L) — Mortality (96h) 0 (Untreated controls) — 14 % 1 mg/L WAF — 0% 10 mg/L WAF — 0% 100 mg/L WAF — 0% * 1000 mg/L WAF — 0% * 10000 mg/L WAF — 0 % * * Symptoms included hypoactive swimming, hemorrhage of the tail and/or gills, loss of equilibrium, immobile and/or swimming at the surface and/or at the bottom
Remarks	WAF is the maximum water soluble concentration of the nominal test concentrations after 48 hours of stirring. Only the water phase was used in the definitive test solutions. Further the WAF did not stay in solution for concentrations ≥10 mg/L. No analytical measurements were carried out on WAF solutions. On day 2 the oxygen concentration dropped to 36% of the saturation level. Since no mortality occurred, it can be concluded that there has been no effect on the outcome of the study
Conclusions	No mortality occurred at any of the five 5 WAFs solutions tested. 96-h LC_{50} >10000 mg/L for the test material. Data would suggest that test substance not expected to cause mortality at its water saturation limit.
Data Quality	Reliable with restrictions [Klimisch reliability 2]. No mortality was observed even at a WAF solution prepared from 10000 mg/L nominal loading rate. It is assumed that test material would be at its maximum water solubility limits at the loading rate of 10000 mg/L.
References	Unpublished confidential business information.
Other	Date last updated October 17, 2003.

Biodegradation (CAS No. 103-24-2)

Test Substance **CAS Number** **Remarks**	Azelaic acid, bis(2-ethylhexyl) ester 103-24-2 Purity was not indicated
Method/guideline	OECD Guideline 301B, 92/69/EEC L383, C.4-C (1992)
Test type **GLP** **Year**	Aerobic Biodegradation Yes 1998
Test system	Exposure Period: 28 Days Inoculum: Activated sludge from municipal sewage treatment plant Kinetics: Not Reported Biodegradation Products: Not Reported Analytical Monitoring: No. Monitoring of evolved CO_2 was carried out by trapping in base solution.
Test Conditions	Incubation was performed under continuous stirring in brown 2 L glass flasks containing 2000 ml of mineral solution with test substance and/or the inoculum, mineral compounds and deionized water were pre-acclimated during one night, and subsequently treated and aerated for 28 days at 20±2°C with CO_2-free air. Test substance (12 mg C/L) + inoculum performed in duplicate. Two blank controls containing mineral medium solution + inoculum. One positive control (sodium acetate 11.7 mg C/L) + inoculum. Toxicity control was also run with test material (12 mg C/L) and sodium acetate (11.7 mg C/L). The amount of inoculum used per vessel was 10 ml/L. The outflowing air from individual biodegradation flask was passed through 3 consecutive CO_2-traps containing 100 ml 0.0125N $Ba(OH)_2$. The amount of CO_2 was determined in the traps by back-titration of residual $Ba(OH)_2$ after 2, 5, 7, 9, 14, 19, 23, 27 and 29 days. On the 28th day, HCl was added to the biodegradation flasks, whereafter final titration was performed on Day 29. Concentrations for Test Substance was 12 mg C /L for test substance. Concentration for sodium acetate (positive control) was 11.7 mg C/L.
Results	Biodegradation was 81% in 28 days (average of duplicates) for the test substance. Test substance met 10-day window criterion for readily biodegradability. Positive control (sodium acetate) achieved 97% biodegradation in 28 days. Toxicity control did not show that test material was inhibitory or toxic to inoculum, and did not affect biodegradation.
Conclusions	The substance was readily biodegradable and was biodegraded to the extent of 81% in 28 days.
Data Quality	Reliable without restrictions [Klimisch reliability 1].
References	Unpublished confidential business information
Other	Date last updated October 17, 2003

Acute Oral Toxicity (CAS No. 28472-97-1)

Test substance	Azelaic acid, diisodecyl ester
CAS Number	28472-97-1
Remarks	Purity was not indicated
Method/guideline	OECD 401, 92/69/EEC
Test type	Acute oral toxicity
GLP	Yes
Year	1993
Test system	Species (Strain): Rat (Wistar) Sex: Male, mean weight 209-221 g and female, mean weight 153-189 g No. of animals: 5/sex/treatment Dosage: Single oral administration (gavage) of 2000 mg/kg bw (dosing volume was 2.2 ml/kg); no controls; feeding *ad libitum* (food was withheld ~16 h prior to dosing and ~3 to 4 h after dosing). Observations: Mortality and clinical signs observed several times on day 0 (day of dosing) and daily until day 14. Body weights on day 0, 7 and 14. Necropsy on day 14. Statist. Method: Not specified
Results	Mortality: 0-14 days; Male Rats (2000 mg/kg): None; Female Rats (2000 mg/kg): None Clinical Signs: 0-14 days; Male Rats (2000 mg/kg): No treatment related effects; Female Rats (2000 mg/kg): No treatment-related effects Body Weight Gain: 0-14 days; Male Rats (2000 mg/kg): No treatment-related effects; Female Rats (2000 mg/kg): No treatment-related effects Necropsy *: 14 days; Male Rats (2000 mg/kg): No treatment-related effects; Female Rats (2000 mg/kg): No treatment-related effects * Incidental findings included urinary retention in bladder, hyperaemia in the lung and hyrometra of the uterus.
Remarks	Study carried out under GLP and OECD guidelines.
Conclusions	Oral LD_{50} > 2000 mg/kg
Data Quality	Reliable without restrictions [Klimisch reliability 1]
References	Unpublished confidential business information
Other	Last updated October 17, 2003

Acute fish toxicity (CAS No. 28472-97-1)

Test Substance	Azelaic acid, diisodecyl ester
CAS Number	28472-97-1
Remarks	Purity was not indicated
Method/guideline	OECD 203 (also complies with 92/69/EWG)
Type (test type)	Static 96-hr acute fish toxicity
Test System	Fish, freshwaer
GLP	No
Year	1993
Species/Strain	Fish, golden orfe (*Leuciscusidus melanotus* L.), 4 weeks old.
Analyt. Monitoring	No chemical analysis performed
Exposure period	96 hours
Statist. Methods	Not specified
Remarks on Test Conditions	96-h static test performed in 8.4L glass vessels containing water (hardness 255 ± 51 mg/L $CaCO_3$); 20±1°C; aerated; unfed. No. of fish: 10/treatment group Nominal concentrations: 0 (untreated control) and 10000 mg/L. Probably water accommodated fractions (WAFs) were generated and used in test. Observations for mortality of fish were performed at 24, 48, 72 and 96 hrs. Daily physical measurement of pH, dissolved oxygen; overall ranges for pH 8.3-8.6; O_2 80-100%. Temperature cited to be maintained at 20 ± 1°C
Results	Nominal test conc. (mg/L) — Mortality (96h) 0 (Untreated controls) — 0 % 10000 mg/L — 0 %
Remarks	Incomplete description of experimental procedure for study. Only the age of the fish and the volume of the test vessels was reported. It is assumed that a WAF is used in this study. WAF is the maximum soluble concentration of the nominal test concentrations. No analytical measurements were given in study.
Conclusions	96-h LC_{50} >10000 mg/L for the test material. Data suggest that test substance would not be expected to cause mortality at its water saturation limit.
Data Quality	Not assignable. [Klimisch reliability 4]. Experimental details are not complete. Difficult to assess reliability of study. However, no mortality was observed at 10,000 mg/L, the nominal loading rate. It is assumed that test material would be at its maximum water solubility limit at the loading rate of 10,000 mg/L.
References	Unpublished confidential business information.
Other	Date last updated October 17, 2003.

Biodegradation (CAS No. 28472-97-1)

Test Substance	Azelaic acid, diisodecyl ester
CAS Number	28472-97-1
Remarks	Purity was not indicated
Method/guideline	CEC-L-33-T-82 Biodegradability of Two-Stroke Cycle Outboard Engine Oils in Water (Co-ordinating European Council)

Test type **GLP** **Year**	Primary Biodegradation No 1993
Test system	Exposure Period: One set of experiments for 7 days, another set for 21 Days Inoculum: Activated Sludge, Domestic, Unacclimated. Analytical Monitoring: Infrared absorbance for C-H stretching band was monitored for disappearance of the parent hydrocarbon lubricant material.
Test Conditions	Biodegradation Test: For the test material and two reference standards, CEC biodegradability test included: 1) nine flasks with medium + test/solvent solution (7.5 mg at the start) + inoculum. 2) four poisoned flasks with medium + test/solvent solution (7.5 mg at the start) + 1 ml of $HgCl_2$ (1% solution). 3) Additionally, neutral flask(s) with medium + inoculum. Flasks with the two reference materials were used to determine positive controls. Abiotic degradation was determined in the poisoned flasks. The filtrate of sewage/activated sludge , collected at a municipal wastewater treatment plant, was used as inoculum. Procedure: Extraction with 1,1,2-trichlorotrifluoroethane under acidic conditions was performed on day 0 for the neutral flasks, 3 of the test and 3 of the reference flasks. The remaining flasks were incubated in the dark, at 20±1°C with constant agitating. The primary biodegradation of the test and reference material was determined by quantitating the amount of unchanged material remaining in the flasks (2 poisoned flasks, 3 test and 3 reference flasks) at day 7 and day 21. This was done by infrared spectroscopy of the extracted test and reference solutions. The absorbance of the C-H stretch at 2931 cm^{-1} (CH_2-CH_3 absorbance band) was measured. Primary degradability was expressed as the percent difference in residual oil contents between the poisoned flasks and the respective test flasks.
Results	**Primary Biodegradation Results:** **% Primary Biodegradation** [Based on Infrared C-H Stretch Absorbance] **Day** — **7** — **21** Test Material — 69 — Not determined Positive Controls Reference Cpd 1 — 15.5 — Not determined Reference Cpd 2 — 24 — Not determined
Remarks	The report is limited: the mineral medium and the treatments were not described in detail. The guideline prescribes an incubation temperature of 25±1°C. This study was performed at a temperature of 20±1°C. Primary degradation is defined as the alteration in the chemical structure of a substance, brought about by biological action, resulting in the loss of a specific property of that substance (IR C-H stretch absorbance). The results represent primary biodegradation and cannot be interpreted to reflect ready biodegradation. As such, the study is not considered useful, but can be seen as supporting data.
Conclusions	Primary biodegradation was 69 % in 7 days for test material.
Data Quality	Not assignable [Klimisch reliability 4]. Test method determined only primary biodegradation; results at 21 days were not performed. Not useful and should be considered as supporting data showing relative biodegradation compared to CEC two reference standards.
References	Unpublished confidential business information
Other	Date last updated October 10, 2003

Melting Point, Boiling Point (CAS No. 106-79-6)

Test Substance **CAS Number** **Remarks**	Sebacic acid, dimethyl ester 106-79-6 Purity not specified
Method/guideline	Not specified
Test type **GLP** **Year**	Melting point and boiling point Not specified Not specified
Remarks	Method of melting point and boiling point determination was not given. Physical chemical properties were cited in Handbook of Chemistry and Physics
Conclusions	Melting Point 38 °C Boiling Point 175 °C (20 mm Hg)
Data Quality	Not assignable [Klimisch reliability 4]. Secondary literature.
References	Handbook of Chemistry and Physics. R.C. Weast (ed.). 53 rd Ed., CRC, Cleveland OH, pg. C-265.
Other	Date last updated October 17, 2003.

Water solubility (CAS No. 106-79-6)

Test Substance **CAS Number** **Remarks**	Sebacic acid, dimethyl ester 106-79-6 Purity not specified
Method/guideline **Test type** **GLP** **Year**	Not specified. Data from secondary literature. Water solubility Not specified Not specified
Remarks	Method of determination was not given.
Conclusions	Water solubility 120 mg/L. Citation by Syracuse Research Corp. as experimental value reported in Beilstein.
Data Quality	Not assignable [Klimisch reliability 4]. Secondary literature.
References	Syracuse Research Corp. This value was cited for water solubility for test material under CAS No. 106-79-6 in EpiWin experimental database.
Other	Date last updated October 17, 2003.

Melting Point, Boiling Point (CAS No. 122-62-3)

Test Substance **CAS Number** **Remarks**	Sebacic acid, bis(2-ethylhexyl) ester 122-62-3 Purity not specified
Method/guideline	Not specified
Test type **GLP** **Year**	Melting point and boiling point Not specified Not specified
Remarks	Method of melting point and boiling point determination was not given. Physical chemical properties were cited in Handbook of Chemistry and Physics
Conclusions	Melting Point -48 °C Boiling Point 256 °C (5 mm Hg)
Data Quality	Not assignable [Klimisch reliability 4]. Secondary literature.
References	CRC Handbook of Chemistry and Physics. DR Lide (ed.). 79th Ed., CRC Press Inc Boca Raton FL, 1999, pg. 3-140.
Other	Date last updated October 17, 2003.

Boiling Point (CAS No. 122-62-3)

Test Substance **CAS Number** **Remarks**	Sebacic acid, bis(2-ethylhexyl) ester 122-62-3 Purity not specified
Method/guideline	Other, not specified. Data obtained from secondary literature.
Test type **GLP** **Year**	Boiling point 212 °C (1 mm Hg) to 256 °C (5 mm Hg) Not specified Not specified
Remarks	Method of boiling point determination was not given. Physical chemical properties were summarized in BIBRA Toxicity Profile document (1996).
Conclusions	Boiling Point 212 °C (1 mm Hg) and 256 °C (5 mm Hg)
Data Quality	Not assignable [Klimisch reliability 4]. Secondary literature.
References	BIBRA (1996). Toxicity Profile for Di(2-ethylhexyl) Sebacate. 6 pp. British Industrial Biological Research Association (BIBRA) and references therein cited.
Other	Date last updated October 24, 2003.

Partition Coefficient (CAS No. 122-62-3)

Test Substance **CAS Number** **Remarks**	Sebacic acid, bis(2-ethylhexyl) ester 122-62-3 Purity not specified

Method/guideline	92/69/EEC, Method A.8 of Commission Directive
Test type **GLP** **Year**	Partition coefficient using shake flask method No 1994
Remarks	Limited information given on experimental procedure.
Conclusions	Pow determined to be 5.55×10^3 at 21 ± 0.5°C. Log Pow = 3.74
Data Quality	Not assignable [Klimisch reliability 4]. Limited information available.
References	Unpublished confidential business information
Other	Date last updated October 24, 2003.

Acute Oral Toxicity (CAS No. 122-62-3)

Test Substance **CAS Number** **Remarks**	Sebacic acid, bis(2-ethylhexyl) ester 122-62-3 Purity not specified
Method/guideline	Not indicated
Test type **GLP** **Year**	Acute oral toxicity in mice and rats Not specified 1977, 1981
Test system	Species: Rats; mice Dosage: Oral gavage, undiluted test substance administered.
Conclusions	The acute oral $LD_{50} > 12.8$ g/kg in rats [Fasset (1981) and Kostov et al. (1977) references cited by BIBRA). Oral $LD_{50} = 9.5$ g/kg (mice) and oral $LD_{50} = 17$ g/kg (rats) for dioctyl sebacate [Izmerov et al. (1977) as cited by BIBRA].
Data Quality	Not assignable [Klimisch reliability 4]. Secondary literature.
References	BIBRA (1996). Toxicity Profile for Di(2-ethylhexyl) Sebacate. 6 pp. British Industrial Biological Research Association (BIBRA) and references therein cited.
Other	Date last updated October 24, 2003.

Repeated Dose Toxicity (CAS No. 122-62-3)

Test Substance **CAS Number** **Remarks**	Sebacic acid, bis(2-ethylhexyl) ester 122-62-3 Purity was not indicated
Method/guideline **Test type** **GLP** **Year**	Other Hepatic peroxisome proliferation No 1978
Species/strain	Rat / F-344

Route of Administ.	Oral administration in diet
Duration of test	3 week
No. of animals	Four for test material; 13 control rats
Dose/Conc. Levels	Dietary concentrations were 2% of test material.
Sex	Male F-344 rats
Frequency of treatment	Daily in the diet
Control Group	Yes, 13 control male rats
Post-exposure measure-ments	Liver weight was measured and sections of liver were taken for electron microscopy fixed in 2% OsO4 in S-collidine buffer and prepared for examination (peroxisome proliferation).
Statist. Methods	Student's t test
Remarks on Test Conditions	In addition, blood was drawn from abdominal aorta and the serum was used to measure for cholesterol, triglycerides, carnitine acetyltransferase and catalase activities.
Results	2% dietary concentration of the test material in treated rats for 3 weeks showed: 1) hepatic peroxisomal proliferation 2) statistically significant elevation in liver weight and in hepatic peroxisomal enzyme activities (catalase and carnitine acetyltransferase) 3) statistically significant but not specified decreases in serum triglycerides.
Remarks	BIBRA (1996) estimated that the 2% diet concentration was about 1000 mg/kg bw/day.
Conclusions	Test material orally administered at 2% in the diet caused hepatic peroxisomal proliferation similar to that reported for bis(2-ethylhexyl) phthalate and bis(2-ethylhexyl) adipate. However, the effects with bis(2-ethylhexyl) sebacate (CAS 122-62-3) were less pronounced relative to those for the two corresponding phthalate and adipate analogues.
Data Quality	Reliable with restrictions [Klimisch reliability 2]. Not GLP. The liver was the only tissue studied and the focus of the study was on evaluating peroxisome proliferation.
References	1) Moody DE, Reddy JK (1978). Hepatic peroxisome (microbody) proliferation in rats fed plasticizers and related compounds. Toxicol. Appl. Pharmacol. **45:** 497-504. 2) BIBRA (1996). Toxicity Profile for Di(2-Ethylhexyl) Sebacate. 6 pp. British Industrial Biological Research Association (BIBRA) and references therein cited.
Other	Date last updated October 24, 2003.

Repeated Dose Toxicity (CAS No. 122-62-3)

Test Substance	Sebacic acid, bis(2-ethylhexyl) ester
CAS Number	122-62-3
Remarks	Purity was not indicated
Method/guideline	Other
Test type	13-week inhalation study
GLP	No
Year	1983
Species/strain	Rats/ F-344
Route of Administ.	Inhalation
Duration of test	1, 7, or 13 weeks
No. of animals	12 rats/treatment
Dose/Conc. Levels	25 or 250 mg/m^3 vapors
Sex	Not specified
Frequency of treatment	4 hrs/day, 5 days/week for 1, 7 or 13 weeks

Control Group	Yes
Post-exposure observat.	No further details given.
Statist. Methods	Not specified
Results/Conclusions	In its review, BIBRA (1996) has cited that there were no adverse systemic or lung effects seen in groups of 12 rats exposed to up to 250 mg/m^3 for 4 hr/day, 5 days/week for 13 weeks. In addition, BIBRA (1996) noted in another study, no deaths occurred when four rats, two guinea pigs and a cat were exposed to 400 mg/m^3, 7 hrs/day for 10 days [see BIBRA (1996); NTP-Dynamac (1986)].
Data Quality	Not assignable [Klimisch reliability 4]. Secondary literature.
References	1) BIBRA (1996). Toxicity Profile for Di(2-Ethylhexyl) Sebacate. 6 pp. British Industrial Biological Research Association (BIBRA) and references therein cited. 2) NTP-Dynamac Corp. (1986). October 31, 1986 Draft Report on the Executive Summary of Data Di(2-Ethylhexyl) Sebacate. NIEHS Contract No. N01-ES-5-507. Submitted by Dynamac Corp. (Rockville, MD) to National Toxicology Program. 33 pp.
Other	Date last updated October 24, 2003.

Genetic Toxicity In Vitro (CAS No. 122-62-3)

Test Substance	Sebacic acid, bis(2-ethylhexyl) ester
CAS Number	122-62-3
Remarks	Purity was not indicated
Method/guideline	OECD 471
Type of Study	Ames *Salmonella* Mutation Assay
Test System	Bacterial
GLP	No
Year	1984
Species/Strain	*Salmonella typhimurium* /TA98; TA100; TA1535; TA1537; TA1538
Metab. Activation	Arochlor-induced hamster and rat liver S9 mixture.
Concentrations	100, 333, 1000, 3333, 10000 μg/plate.
Statist. Methods	Not specified but positive controls were run concurrently with test substance.
Remarks on Test Conditions	Negative control was DMSO solvent (vehicle). Positive controls included: 2-aminoanthracene (all strains with S9); 4-nitro-o-phenylenediamine (TA98), sodium azide (TA100, TA1535), 9-aminoacridine (TA1537) (all without S9)
Results/Remarks	The test substance was negative in all four tester strains. No mutagenic activity was observed at a range of doses from 100 to 10000 μg/plate with or without metabolic activation. The positive and negative controls gave the appropriate response as expected.
Remarks	Precipitate was observed at 3333 and 10000 μg/plate in the assay with TA1535. No appreciable toxicity was observed. Only four strains of Salmonella were used and no triplicate plating was used.
Conclusions	The test substance was not mutagenic, with or without metabolic activation.
Data Quality	Reliable with restrictions [Klimisch reliability 2]. Non-GLP study.
References	Zeiger E, Haworth S, Mortelmans K, Speck W. Mutagenicity testing of di(ethylhexyl) phthalate and related chemicals in Salmonella. Environ. Mutagen. 7(2): 213-232 (1985)
Other	Date last updated October 24, 2003.

Reproductive/Developmental Toxicity (CAS No. 122-62-3)

Test Substance	Sebacic acid, bis(2-ethylhexyl) ester
CAS Number	122-62-3
Remarks	Purity was not indicated
Method/guideline	Other, not indicated
Test type	19-Month dietary feeding study
GLP	No
Year	1968
Species/strain	Rat / Wistar
Route of Administ.	Diet containing dioctyl sebacate at 200 ppm (~10 mg/kg/day)
Duration of test	19 Months, four-generation study
Sex, No. of animals	Male and female rats, not specified
Dose/Conc. Levels	200 ppm in the diet (BIBRA estimated this to be equivalent to ~10 mg/kg/day)
Frequency of treatment	Daily in diet for 19 months
Control Group	Yes
Statist. Methods	Not specified.
Remarks	Limited experimental information given.
Results/Conclusions	Lefaux (1968) cited that "no disturbance of growth was found with male or female rats and the growth curves could be superimposed on those of controls. No pathological symptoms were observed during the investigation. After death, macroscopic examination of organs as well as histological sections failed to reveal any lesions or abnormality" ... "Reproduction was normal. No abnormalities were found during parturition or nursing by rats of various generations. In each generation, growth was normal." In its toxicity review, BIBRA (1996) cited that " reproduction, suckling and growth were evidently normal in a four-generation study of rats fed a diet containing 200 ppm [about 10 mg/kg bw/day]". No adverse effects or histological evidence reported for reproductive tissues in male or female rats.
Data Quality	Not assignable [Klimisch reliability 4]. Secondary literature.
References	1) Lefaux R (1968). Practical Toxicology of Plastics. CRC Press, Cleveland OH, pp 363-364. 2) BIBRA (1996). Toxicity Profile for Di(2-Ethylhexyl) Sebacate. 6 pp. British Industrial Biological Research Association (BIBRA) and references therein cited.
Other	Date last updated October 24, 2003.

Acute fish toxicity (CAS No. 122-62-3)

Test Substance	Sebacic acid, bis(2-ethylhexyl) ester
CAS Number	122-62-3
Remarks	Purity was not indicated
Method/guideline	OECD 203, 92/69/EEC
Type (test type)	96-hr Semi-static (renewal) acute fish toxicity
Test System	Fish, freshwaer
GLP	No
Year	1994

Species/Strain **Analyt. Monitoring** **Exposure period** **Statist. Methods**	Fish / golden orfe (*Leuciscus idus*), length 57 ± 2 mm TOC analysis of fresh medium at 0 and 72 hr and old medium at 24 and 96 hr. 96 hours Not specified
Remarks on Test Conditions	96-hr semi-static (renewals at 24, 48 and 72 hr) test performed in 20L glass vessels, dechlorinated tap water (hardness ~100 mg/L $CaCO_3$); 21°C; aerated; loading 0.98 g/L. No. of fish: 10/replicate, 2 replicate/treatment, 1 replicate for control Concentrations: Water accommodated fraction (WAF) generated at 1000 mg/L nominal loading rate and control (0 mg/L , untreated). Observations for mortality of fish were performed at 3, 6, 24, 48, 72 and 96 hrs. Daily physical measurement of pH, dissolved oxygen was not indicated. Temperature was reported to be maintained at 21°C
Results	Nominal test conc. (mg/L) — Mortality (96h) 0 (Untreated controls) — 0 % 1000 mg/L WAF — 0 %
Remarks	WAF was prepared by 24 hr stirring test material (1000 mg/L loading rate) and allowing for settling and equilibration for 1 hr before WAF solution was taken for study. The analytical results (TOC) showed very low concentrations of the test substance in the test WAF solutions. This was due most likely to very low solubility of the test substance in the water. No information was reported about the light regime, feeding of the fish, pH and dissolved oxygen concentration.
Conclusions	96-hr LC_{50} >1000 mg/L (WAF) for the test material. Analytical data indicated very low water solubility of test material in WAF solution. Data suggest that test substance would not be expected to cause mortality at its water saturation limit.
Data Quality	Reliable with restrictions [Klimisch reliability 2]. Not GLP and some experimental details were not reported. No mortality was observed at the tested 1000 mg/L WAF solution. It is assumed that test material would be at its maximum water solubility limits at the loading rate of 1000 mg/L. Hence, test substance would not be expected to cause mortality at its water solubility or water saturated level.
References	Unpublished confidential business information.
Other	Date last updated October 24, 2003.

Acute toxicity to aquatic invertebrate (CAS No. 122-62-3)

Test Substance **CAS Number** **Remarks**	Sebacic acid, bis(2-ethylhexyl) ester 122-62-3 Purity was not indicated
Method/guideline **Type (test type)** **Test System** **GLP** **Year**	OECD 202 (1984 Guidelines) Daphnia sp. Acute immobilization test . Freshwater invertebrate No 1994
Species/Strain **Analyt. Monitoring**	*Daphnia magna* TOC analysis of control and WAF solutions (generated from 1000 mg/L loading rate) at 0 and 48 hr.

Exposure period	48 hours
Statist. Methods	Not specified
Remarks on Test Conditions	48-Hr static test at limited concentration. Test performed in 200 ml containers in reconstituted water; 21°C; aerated, no aeration. No. of daphnids: 10/replicate, 4 replicates/treatment, 2 replicates/control. Concentrations: Water accommodated fraction (WAF) generated at 1000 mg/L nominal loading rate and control (0 mg/L , untreated). Observations for immobilized daphnids for mortality of fish were performed at 24 and 48 hr. Daily physical measurement of pH, dissolved oxygen was not indicated. Temperature cited to be 21°C
Results	Nominal test conc. (mg/L) — % Immobilized (48h) 0 (Untreated controls) — 0 % 1000 mg/L WAF — 0 %
Remarks	WAF was prepared by 24 hr stirring test material (1000 mg/L loading rate) and allowing for settling and equilibration for 1 hr before WAF solution was taken for study. The analytical results (TOC) showed very low concentrations of the test substance in the test WAF solutions. This was due most likely to very low solubility of the test substance in water. No information was reported on light regime, feeding, pH or dissolved oxygen. Age of the *Daphnia magna* was not specified.
Conclusions	48-hr EC_{50} >1000 mg/L (WAF, nominal loading rate). Analytical data indicated presence of test material in WAF solution, albeit very low concentrations. Data would suggest that test substance not expected to cause any immobilization at its water saturation limit.
Data Quality	Reliable with restrictions [Klimisch reliability 2]. Not GLP and some experimental details were not reported. However, no immobilization of daphnids was observed at the tested 1000 mg/L WAF solution . It is assumed that test material would be at its maximum water solubility limits at the loading rate of 1000 mg/L.
References	Unpublished confidential business information.
Other	Date last updated October 24, 2003.

Acute toxicity to aquatic plants (e.g., algae) (CAS No. 122-62-3)

Test Substance	Sebacic acid, bis(2-ethylhexyl) ester
CAS Number	122-62-3
Remarks	Purity was not indicated
Method/guideline	OECD 201
Type (test type)	Algae, growth inhibition test
Test System	Aquatic plant (e.g., algae)
GLP	No
Year	1994
Species/Strain	Green algae (*Scenedesmus subspicatus*).
Analyt. Monitoring	TOC analysis of control and WAF solutions (1000 mg/L nominal) at 0 and at 72 hr.
Exposure period	72 hours
Statist. Methods	Student t-test
Remarks on Test Conditions	72-hr static limited concentration test in 250 mL loosely stoppered flasks with 100 mL of algal medium (pH 8.0); temperature: 24°C; continuous illumination (~7000 lux); continuously shaken at 100 rpm. Initial cell conc: 1.9×10^4 cells/ml in controls No. of replicates: 6 replicates/treatment, 3 replicates/control.

	Concentrations: Water accommodated fraction (WAF) generated at 1000 mg/L nominal loading rate and untreated controls (0 mg/L). Observations: Cell density determined at 0, 24, 48 and 72 hr spectrophotometrically for treated flasks; control cultures at 0 and 72 h by counting with haemacytometer Measurement of pH 8.0 at 0 h and pH 10.0-10.2 at 72 h
Results	Mean Cell Density (Algae) Time / Control (0 mg/L) / 1000 mg/L WAF (nominal loading rate) 0 hr / 1.9×10^4 cells/ml / 1.9×10^4 cells/ml 24 / 5.5×10^4 / 5.4×10^4 48 / 14×10^4 / 13×10^4 72 / 49×10^4 / 49×10^4 Nominal test conc. (mg/L) / AUC % Inhibition (0-72h) / Growth Rate % Inhibition (0-72h) 0 (Untreated controls) / 0 % / 0% 1000 mg/L WAF / 1 % / 0%
Remarks	In this study, an initial WAF solution with a loading rate of 2000 mg/L was prepared, which was diluted by one-half with algal suspension to give a final WAF solution at a loading rate of 1000 mg/L. Increases in pH were recorded, probably associated with strong cell growth in the test (growth factor of 26 in 72 h). The analytical results (TOC) showed very low concentrations of the test substance in the WAF solutions at 0 h. This was due most likely to very low solubility of the test substance in water. For the treatment flasks only absorbance values were given to indicate cell growth in the test. Cell densities were obtained using calibration curve and using measured cell densities for the control at 0 and 72 h. The growth inhibition was analyzed by the method specified in OECD 201.
Conclusions	72-hr EC_{50} >1000 mg/L (WAF, nominal loading rate). No inhibition of algae growth was observed with WAF solution of the test material. Data suggest that test substance would not be expected to inhibit algal growth at its water saturation limit.
Data Quality	Reliable with restrictions [Klimisch reliability 2]. Not GLP. It is assumed that test material would be at its maximum water solubility limit in the WAF solution generated from the loading rate of 1000 mg/L.
References	Unpublished confidential business information.
Other	Date last updated October 24, 2003.

Biodegradation (CAS No. 122-62-3)

Test Substance	Sebacic acid, bis(2-ethylhexyl) ester
CAS Number	122-62-3
Remarks	Purity was 100 %
Method/guideline	Not Specified
Test type	Aerobic Biodegradation using CO_2 evolution method.
GLP	No
Year	1994
Test system	Exposure Period: 28 Days Inoculum: Activated sludge from municipal sewage treatment plant Kinetics: Not Reported
Test Conditions	Inoculum: from activated sludge from the aeration stage of a sewage treatment plant.

	Amount inoculum 10 ml/L (=1%). Blank control [medium + inoculum]; Positive control [medium + inoculum + sodium benzoate (10 mg C/l)]; Treated [medium + inoculum + test material (20 mg C/l)]. Incubation was performed in darkness under continuous stirring in vessels. The inoculum and medium were pre-acclimated during 24 hours, and subsequently treated and aerated for 29 days at 21-22°C with CO_2-free air. The outcoming air was passed through 2 consecutive CO_2-traps containing 350 ml 0.05 M NaOH. The amount of CO_2 was determined in the traps in duplicate by analysis on a Total Carbon Analyser at various time intervals. pH were measured on day 28 in both vessels (pH = 7.4). Concentrations for Test Substance was 20 mg C /L for test substance. Concentration for sodium benzoate (positive control) was 10 mg C/L.
Results	Biodegradation was 65% in 28 days for the test substance. Test substance did not meet 10-day window criterion for readily biodegradability. Positive control (sodium benzoate) achieved maximum of 90% biodegradation at 27 days. Toxicity control did not show that test material was inhibitory or toxic to inoculum and did not affect biodegradation. Biodegradation values were corrected for background CO_2 with blank controls. **Biodegradation Results:**

% Biodegradation [% of ThCO2]

Day	**1**	**2**	**3**	**6**	**8**	**10**	**12**	**16**	**20**	**22**	**24**	**27**	**28**
Test Material	0	3	10	29	38	49	55	59	60	60	64	66	65
Positive Control (sodium benzoate)	5	50	63	81	80	85	87	84	84	--	89	90	87

Conclusions	The test substance was not readily biodegradable (i.e., did not meet the 10-day window criterion) and was biodegraded to the extent of 65% in 28 days.
Data Quality	Reliable with restrictions [Klimisch reliability 2]. Not GLP. Replicates were not used in test.
References	Unpublished confidential business information
Other	Date last updated October 24, 2003

Part II. Surrogate Diesters

Toxicity SIDS Endpoint Summary (CAS No. 105-76-0) - Surrogate Diester [from OECD SIDS for Maleic acid, dibutyl ester, CAS No. 105-76-0, UNEP (1998)]

	SPECIES	PROTOCOLS/ METHODS	RESULTS
Physicochemical Properties			
Melting Point			< -60 °C
Boiling Point			277-280 °C at 988 hPa
Vapor Pressure			< 1 x 10^{-2} hPa at 20 °C
Partition Coeffic. (log Pow)			3.38 at 20 °C
Water Solubility			173 mg/L at 20 °C
Environ. Fate-Biodegradation			
Photodegradation			
Hydrolysis Stability in water			15% hydrolyzed at pH 1.2 (37 °C) for 144 hr $t_{1/2}$ = 2870 hr, pH 7 (25 °C) $t_{1/2}$ = 50 hr, pH 9 (25 °C)
Fugacity Transport-Distribution		Calculated EQC- Level III fugacity model	Soil 55.9% (% in environmental compartment) Air 2.7% Water 39.3% Sediment 2.2%
Biodegradation		84/449/EWGC3 (OECD 301E)	95% biodegradation in 19 days (OECD screening test) Readily Biodegradable
Ecotoxicity Data			
Acute toxicity to fish	Rainbow trout	OECD 203	LC_{50} (96 hr) = 1.2 mg/L
Acute toxicity to invertebrates	*Daphnia magna*	OECD 202	EC_{50} (48 hr) = 21 mg/L EC_0 = 10 mg/L
Acute toxicity to aquatic plants - algae	*Scenedesmus subspicatus*	OECD 201	EC_{50} (72 hr) = 6.2 mg/L EC_0 = 4.2 mg/L

Mammalian Toxicity	**SPECIES** / Strain	**PROTOCOL/ METHOD**	**RESULTS**
Acute Oral Toxicity	Rat / Carworth-Wistar	Smyth et al. (1954)	LD_{50} 3730 mg/kg
Repeated Dose Tox.	Rat / Wistar CRL:(WI)BR	OECD Draft Combined Repeated Dose/ Reprod Screen	NOAEL = 95 mg/kg based on liver and kidney endpoints
Genetic Tox - In Vitro Bacterial Test (gene mutation)		OECD 471	Negative for mutagenic activity, with and without metabolic activation in Ames assay
Genetic Tox - in vivo	Mouse / NMRI	OECD 474	Negative for genotoxic effects in micronucleus test.
Toxicity to Reproduc-tion	Rat / Wistar CRL:(WI)BR	OECD Draft Combined Repeat Dose/ Reprod Screen (1990)	NOEL = 95 mg/kg for both male and female rats. No adverse effect on reproduction was reported.
Developmental tox/ teratogenicity			No adverse developmental effects were reported in reproductive screening study.
Remarks	Various other toxicity data have been reported in the OECD SIDS document for maleic acid, dibutyl ester. The relevant SIDS toxicity endpoints for bridging data gaps to the "diesters" HPV test plan are summarized above. Detailed robust summaries are discussed and can be found in the full OECD SIDS dossier [pp. 13-29, UNEP (1998)].		
References	UNEP (1998). OECD SIDS. Maleic Acid, Dibutyl ester (CAS 105-76-0). United Nations Environment Programme. Chemicals Screening Information Dataset (SIDS) for High Volume Chemicals. October 1998. SIDS document for Maleic Acid, Dibutyl ester downloadable online from UNEP website at http://www.chem.unep.ch/irptc/Publications/ sidsidex/sidsidex.htm (accessed July 31, 2003).		
Other	Date: October 28, 2003		

Melting Point, Boiling Point (CAS No. 105-99-7)
Adipic Acid, dibutyl ester - Surrogate Diester

Test Substance **CAS Number** **Remarks**	Adipic acid, dibutyl ester 105-99-7 Purity was not indicated
Method/guideline	Other, not specified. Data obtained from secondary literature.
Test type **GLP** **Year**	Melting point and boiling point Not specified Not specified
Remarks	Method of melting point and boiling point determination was not given. Physical chemical properties were cited in Handbook of Chemistry and Physics.
Conclusions	Melting Point - 32 °C Boiling Point 165 °C (10 mm Hg)
Data Quality	Not assignable [Klimisch reliability 4]. Secondary literature.
References	Handbook of Chemistry and Physics (1998). D.R. Lide (ed.). 78th Ed., CRC Press, Boca Raton FL, pg. 3-187.
Other	Date last updated October 27, 2003.

Acute Oral Toxicity (CAS No. 105-99-7)
Adipic Acid, dibutyl ester - Surrogate Diester

Test Substance **CAS Number** **Remarks**	Adipic acid, dibutyl ester 105-99-7 Purity not specified
Method/guideline **Test type** **GLP** **Year**	Not indicated Acute oral toxicity Not specified 1951
Test system	Species: Rats Dosage: Oral gavage, undiluted test substance administered.
Conclusions	The acute oral LD_{50} = 12.9 g/kg [Smyth et al. (1951) and as cited in David et al. (2001)]
Data Quality	Not assignable. [Klimisch reliability 4]. Secondary literature. Range-finding study; limited number of animals.
References	1) Smyth HF, Carpenter, CP, Weil CS (1951). Range-finding toxicity data: List IV. Arch. Indust. Hyg. Occup. Med. **4:** 119 (1951). 2) David RM, et al. (2001). Esters of aromatic mono-, di-, and tricarboxylic acids, aromatic diacids and di-, tri-, or polyalcohols *in* Patty's Toxicology, 5th edition, Bingham E, et al. (eds.), Vol. 6, Chapter 80, J. Wiley, New York. Cited in Table 80.14 and on pg. 765.
Other	Date last updated October 28, 2003.

Toxicity Endpoint Summary (CAS No. 68515-75-3) - Surrogate Diester

[summarized from HPV Test Plan submitted to U.S. EPA by Solutia, Inc. (Nov. 20, 2002) for Hexanedioic acid, Di-C7-C9 Branched and Linear Alkyl Ester (97 Adipate) (CAS 68515-75-3)]

	SPECIES	PROTOCOLS/ METHODS	RESULTS
Physicochemical Properties			
Melting Point			
Boiling Point			224 °C
Vapor Pressure			13 hPa at 224 °C
Partition Coeffic. (log Pow)			> 6.48
Water Solubility		Saturator column technique	< 0.048 mg/L at 25 °C
Environ. Fate-Biodegradation			
Photodegradation		ASTM E47.06 Sunlight photo-lysis screen	0% in 14 days
Hydrolysis Stability in water			
Fugacity Transport-Distribution		Calculated EQC- Level III Fugacity model	Soil 27.3% (% in environmental compartment) Air 0.3% Water 3.6% Sediment 68.8%
Biodegradation		OECD 302A and CO_2 evolu-tion methods	67-88% Readily biodegradable
Ecotoxicity Data			
Acute toxicity to fish	Rainbow trout	EPA 600/3-75-009 (1975)	LC_{50} (96 hr) > 1000 mg/L
Acute toxicity to invertebrates	*Daphnia magna*	EPA 600/3-75-009 (1975)	EC_{50} (48 hr) = 1.9 mg/L EC_0 = 1 mg/L
Acute toxicity to aquatic plants, algae	*Selenastrum capricornutum*	EPA Printz Algal Assay	EC_{50} (96 hr) = 1.8 to 2.5 mg/L Level of ecotoxicity was noted by Solutia to be above the water solubility level or water saturated limit of 0.048 mg/L for CAS No. 68515-75-3.

Mammalian Toxicity	SPECIES / Strain	PROTOCOL/ METHOD	RESULTS
Acute Oral Toxicity	Rats / S.D.		LD_{50} > 15,800 mg/kg bw
Repeated Dose Tox.	Rats / S.D.	Similar to OECD 408	NOAEL 2.5% diet, male rat ~1500 mg/kg/day NOAEL 2.5% diet, female rat ~1950 mg/kg/day No systemic toxicity reported in this 13-week dietary feeding study. No reported adverse effects to male or female reproductive organs.
Genetic Tox - In Vitro Bacterial Test (gene mutation)	*Salmonella typhimurium*	OECD 471	Negative for mutagenic activity with or without metabolic activation.
Toxicity to Reproduction	Rats / S.D.	OECD 414	No effects to reproductive organs (male or female) in 13 week oral feeding study at 2.5% in the diet.
Developmental tox/ teratogenicity	Rats / S.D.		NOAEL 4000 mg/kg (maternal toxicity, embryotoxicity, fetotoxicity) NOAEL 7000 mg/kg (teratogenicity) Oral gavage study at 1000, 4000 and 7000 mg/kg during gestation days 6-19 in female Sprague-Dawley rats

Remarks	Detailed robust summaries for the various SIDS endpoints for CAS No. 68515-75-3 are given in the supporting robust summary documentation submitted by Solutia, Inc. to the U.S. EPA. This information is available at the http:/www.epa.gov/chemrtk/hexanedi/c14079tc.htm
Data Quality	See Solutia's HPV Test Plan and robust summaries in an accompanying appendix submitted to the U.S. EPA.
References	Solutia Inc. (2002). HPV Chemical Challenge Program Test Plan for Hexanedioic acid, Di-C7-C9 Branched and Linear Alkyl Ester (97 Adipate) (CAS No. 68515-75-3). Received by EPA on November 20, 2002. HPV Test Plan (16 pp) and Robust Summaries (40 pp). The ACC Aliphatic Esters Panel would like to kindly thank Solutia, Inc. for permission to reference the toxicity data for hexanedioic acid, di-C7-C9 branched and linear alkyl ester (97 Adipate) (CAS No. 68515-75-3).
Other	Date: October 29, 2003

Toxicity SIDS Endpoint Data Summary for CAS No. 103-23-1
Adipic acid, bis(2-ethylhexyl)ester - Surrogate Diester
[summarized from David et al. (2001), BIBRA (1996), IUCLID (2000) and other references]

	SPECIES	PROTOCOLS/ METHODS	RESULTS
Physicochemical Properties			
Melting Point			-67.8 °C Handbook of Chemistry (1998)
Boiling Point			417 °C (David et al. 2001), (WHO 2003) 214 °C (5 mm Hg) Handbook of Chemistry (1998)
Vapor Pressure			0.021 hPa (100 °C) (IUCLID 2000)
Partition Coeffic.			
Water Solubility		Slow stir technique	0.0032 mg/L (Letinski et al. 2002)
Environ. Fate-Biodegradation			
Photodegradation			
Hydrolysis Stability in water			
Fugacity Transport-Distribution		Calculated EpiWin / EQC Level III	Soil 31.4% (% in environmental compartment) Air 1.0% Water 10.8% Sediment 56.8%
Biodegradation		OECD 301B, 301C (MITI)	67-74% in 28 days OECD 301C 94% in 35 days OECD 301B Readily Biodegradable
Ecotoxicity Data			
Acute toxicity to fish	Fish		LC_{50} 54-150 mg/L (Vershueren, 1996; IUCLID, 2000)
Acute toxicity to aquatic invertebrates	*Daphnia magna*	OECD 202	EC_{50} (48 hr) >500 mg/L (Vershueren, 1996) EC_0 (48 hr) 250 mg/L (Vershueren, 1996)
Chronic toxicity to aquatic invertebrate	*Daphnia magna*	OECD 211	21-day reproduction study in Daphnia magna showed no chronic toxicity at saturated water solubility conc limit (measured conc. tested was 0.00436 mg/L). NOEC was 0.00436 mg/l (measured) for survival, reproduction, growth (ENSR, 2003). GC-MS analysis of WAF renewal solutions confirmed test material was present at or close to maximal water solubility level (WSL).
Acute toxicity to aquatic plants - algae	Algae	OECD 201	EC_{50} > 500 mg/L (Vershueren, 1996)

Mammalian Toxicity	SPECIES / Strain	PROTOCOL/ METHOD	RESULTS
Acute Oral Toxicity	Rat		7.392 g/kg and 9.1 g/kg
Repeated Dose Tox.	Rat, Mouse		13-week dietary feeding studies NOAEL (rat ~300 mg/kg/d; mouse ~230 mg/kg/d) LOAEL (rat ~600 mg/kg/d; mouse~460 mg/kg/d) Also NTP carcinogenicity bioassays study in rats and mouse (NTP, 1982; IARC, 1982).
Genetic Tox - In Vitro Bacterial Test (gene mutation)	*Salmonella typhimurium*		Negative for mutagenic activity, with and without metabolic activation Negative for chromosomal aberrations in the Chinese hamster ovary cell assay or the mouse micronucleus test (in vitro) with and without metabolic activation
Genetic Tox - in vivo	Mouse		Negative for genotoxic effects in the micronucleus test in vivo (mouse)
Toxicity to Reproduction	Rats	OECD 415	One-generation study oral dietary study carried out in male and female rats at dose levels of 0, 28, 170 or 1080 mg/kg/d in diet. After 10 weeks on the diet, the animals were mated to produce one generation of offspring. Test diets were fed continuously throughout the study (18-19 weeks of exposure). No effects were seen on male or female fertility. At the highest dose, there was a reduction in body weight in the dams, and reduction in offspring body weight, total litter weight and litter size. NOAEL was 170 mg/kg/day LOAEL was 1080 mg/kg/day (ICI, 1988a).
Developmental tox/ teratogenicity	Rats	OECD 414	Pregnant rats administered 2-ethylhexyl adipate in the diet throughout gestation showed reduced body weight at dietary equivalent doses of 1080 mg/kg/day. At 1080 mg/kg/day, implantation fetal loss was evident; however, no gross, skeletal or visceral abnormalities were observed. LOAEL was 1080 mg/kg/day NOAEL was 170 mg/kg/day for developmental toxicity (ICI, 1988b). NOAEL was 28 mg/kg/d for fetotoxicity.
Remarks	See cited references below for additional experimental information on toxicity endpoints and for further review and discussion of findings and other comments. Detailed summaries or robust summaries can be found in the IUCLID dataset (2000) and in other references listed below.		
References	1) David RM, et al. (2001). Esters of aromatic mono-, di-, and tricarboxylic acids, aromatic diacids and di-, tri-, or polyalcohols *in* Patty's Toxicology, 5th edition, Bingham E, et al. (eds.), Vol. 6, Chapter 80, pp. 635-932. J. Wiley, New York. 2) BIBRA (1991). Toxicity Profile for Di(2-Ethylhexyl) Adipate. 9 pp. Second edition (1991). British Industrial Biological Research Association (BIBRA) and references therein cited. 3) IUCLID (2000). IUCLID data set for Bis(2-ethylhexyl) Adipate, CAS No. 103-23-1,		

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